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Contractors and Engineers Monthly

Vol. 45, No. 10

OCTOBER, 1948

\$3 a Year, 50 Cents a Copy

Covering the Field

Two Bituminous Paving Jobs

Page 1 describes how fine sands of Nebraska make durable, economical highways.

Read, too, on Page 23, how Texas solved a problem by undersealing, resurfacing 17.3 miles of worn portland-cement concrete.

Modern Equipment for RR Job

Powerful excavating units tear through Ozark Hills to relocate 5 miles of the Missouri Pacific railroad. On this page.

Airport Well on Its Way

Excavation is facilitated by sand and sand-gravel area on Baltimore Airport operations. Three asphalt plants with 290-ton-per-hour capacity supply the hot-mix. The account is on Page 2.

Bridge on Dry Land

Engineers build bridge on dry land first; then alter course of river, making it flow under bridge. Page 5 explains.

Sorely Needed Lock Begun

New Algiers Lock with timber-pile foundation will be part of alternate route of Intracoastal Waterway. Page 17 tells how it is being accomplished.

Death Knows No Holiday

A safety engineer looks at accident prevention from the common-sense angle. The story is on Page 28.

Low-Cost Secondary Roads

Economical secondary-road program adapts method of construction to prevailing soil conditions. Read about it on Page 33.

Route 27 Gets New Look

On Page 37 is the report of the widening of a 5-mile stretch of concrete pavement just outside of Michigan's capital city.

Valve Care Means Engine Life

Read about engine valves, their performance, and care on Page 44. The article is sure to prove helpful.

Parkway Panorama

For a comprehensive pictorial peek at the future Penn-Lincoln Expressway, turn to Pages 52 and 53.

Experience Is Best Teacher

Varied background of contractor H. J. Friedman of Georgia is of immeasurable value in construction field. Read his Portrait in Print on Page 55.

Apartment Buildings Shoot Up

Turn to Page 59 for the story on the fast-rising apartment buildings on the lower east side of Manhattan.

Mammoth Dam Project Under Way

Jim Woodruff Dam starts ball rolling on river-system development plan in West Florida and Georgia. Page 63 reports it.

Dredging Channel No Cinch

Rock excavation in Florida channel-dredging handled by ladder-type dredge with interesting history. See Page 78.

Slicing Bridge-Repair Costs

Auglaize County, Ohio, does it by welding. Let the county engineer explain it to you on Page 91.

(You will find "In This Issue" on Page 4)

Deep Cuts Highlight Railroad Relocation

Heavy Grading Job Sees Large Power Equipment Rip Through Ozark Hills For New M-P Line

IN a striking demonstration of the effective power of modern excavating equipment, 47 units of the Clarkson Construction Co. of Kansas City, Mo., have ripped a 150-foot-deep cut through the Ozark hills 4 miles south of Ironton, Mo. The work was done to provide a new 5-mile line change for the Missouri Pacific Railroad Co. of St. Louis. Excavated material from the big cut was spread out in high fills, and surplus excavated material has been used to control erosion on cut slopes. A kind of levee system has been built along the top of the slopes, and all ravines leading into the cut have been filled in. This will divert drainage from adjacent hills to the ends of the cut, and into natural waterways at those points.

The \$610,000 contract called for the excavation of 1,850,000 cubic yards of earth, gravel, and boulders. The new line change drops railroad grades from 2.45 to 1.25 per cent. Railroad engineers, who for years have had to use pusher engines even on passenger trains over eleven cars, estimate that the saving through the elimination of pusher service will fully justify the project.

The Clarkson Construction Co. contract called only for clearing, grubbing, and grading. Several concrete culverts had been built previously by railroad crews, while ballast and track laying will follow Clarkson's job. The Clarkson contract began on June 16, 1947, and will be completed this autumn.

Embankment Design

The new line change passes through

rough hill country in the Missouri Ozarks, in the southeastern part of the state, about 100 miles north of the Arkansas state line. Starting from the main line between St. Louis and Little Rock just north of Tip Top Peak near Ironton, it rises on a much gentler slope than the old railroad line. Embankment sections on some of the high 45-foot fills were built with 2 to 1 side slopes, a 22-foot crown, and a cored-out trench 12 inches deep and 10 feet wide, centered on the embankment, to carry ballast and track.

Cut sections were dug with 1½ to 1 side slopes, leaving a total width of 40 feet from toe to toe. A raised 20-foot roadbed in the center provides side drainage along the ditches.

Job Organization

The job was done under the supervision of R. P. Hart, Chief Engineer, and W. H. Giles, Engineer of Design, of the Missouri Pacific Railroad, with Jack Yarber as Resident Engineer. All operations for the Clarkson Construction Co. were under the direction of Superintendent L. C. Brown.

The Clarkson Co. set up the job to operate two 10-hour shifts per day on excavation, drilling, and fill. Loading of explosives was done only on one shift, and managed to stay up with the drilling crews.

Before anything could be done in the way of excavation, however, the 5-mile section had to be cleared. Heavy oak trees, hickory, and elm covered the hills. The contractor hired a 40-man labor crew, brought in two Caterpillar D8 tractors with bulldozer blades, and set to work. In fill sections the trees were sawed off 12 inches above the ground, and the stumps were left to be covered with embankment material.

(Continued on page 12)



C. & E. M. Photo

An Etnyre distributor applies SMC-3 asphalt to a windrow of sand and loess during the Missouri Valley Construction Co. job on Nebraska Highway 2.

Asphalt Stabilizes Fine-Sand Dunes

Bituminous Highway Work In Sand-Hills Country Builds Fine Roads With Sand, Loess, and Asphalt

FOR many years, highway engineers of Nebraska's Department of Roads and Irrigation have searched for ways to build strong, economical highways through the sand-hills country in the western part of the state. They have done considerable experimental work, and today they believe they have the answer: asphalt and filler stabilization of the fine sands.

The finished product is called a "sand-hill road". Built at reasonable cost even by 1948 standards, it consists of fine native sand, finer loess-soil filler from near-by pits, and asphalt. With their materials mixed, blended, and laid down in the form of a mat, these roads have stood up remarkably well under moderate conditions of traffic.

On Nebraska Highway 2, between the small towns of Thedford and Halsey, a piece of this work is currently in progress under a \$189,835 contract with Missouri Valley Construction Co. of Omaha, Nebr. A 6.474-mile section is being completely built for about \$29,323 per mile, including extensive grading, slope protection, detour construction, culverts, bituminous-sand surface course, and armor-coat work. When the job is finished 110 working days from May 3, 1948, that section of Highway 2 should give no trouble for many years, if it proves to be like recent work of the same order.

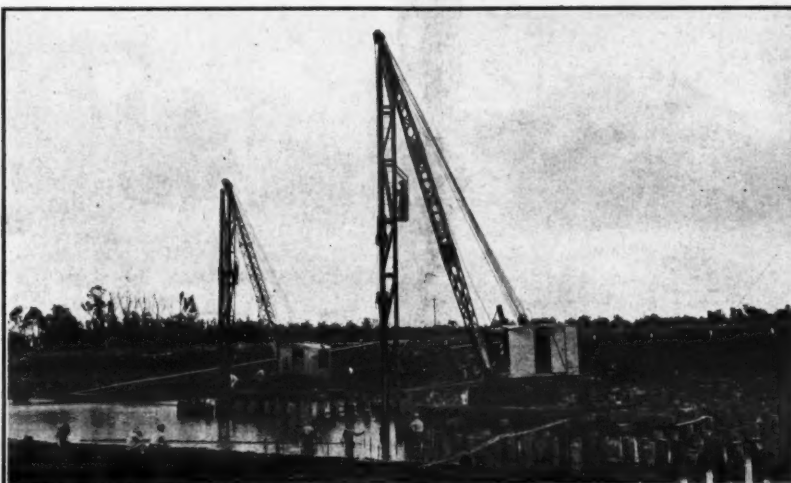
New Road Design

The new road is built with an asphalt-stabilized mat 5 inches thick. This mat is 27 feet wide at the top, 29 feet wide at its base. Backslopes are generally 2 to 1 and 3 to 1. Fill slopes run 3 to 1 up to 8 feet in height; 2 to 1 over 8 feet.

The top of this mat is protected from traffic wear by an armor coat composed of RC-3 asphalt and cover chips, laid after the mat is all finished. The sub-

(Continued on page 70)

TIMBER PILES ARE DRIVEN FOR LOCK FOUNDATION



C. & E. M. Photo

Working from platforms built over the piles already driven, two Koehring cranes with 50-foot booms and 65-foot swinging steel leads drive timber-pile foundations for Algiers Lock in Louisiana. They are using 4,600-pound drop hammers. See page 17.

Asphalt Runways Are Laid For New Baltimore Airport

Supported on Sand-Gravel Well Compacted Subgrade; Big Equipment Fleet Moves 6,600,000 Yards of Dirt

★ WHEN the present paving contract is completed, the new Friendship International Airport at Baltimore, Md., will have three bituminous-concrete runways on which to begin operations. An east-west instrument runway is the largest; it is paved to 8,000 x 200 feet and graded to 10,000 feet. The other two runways, northeast-southwest and northwest-southeast, are paved to 6,500 x 150 feet and graded to 8,000 feet. The pavement is 10 inches thick. It consists of a 7-inch base course put down in two 3½-inch layers and topped by two 1½-inch wearing courses—binder and surface. They are supported on a sand-gravel heavily compacted subgrade, constructed from material at the site.

The big project was divided into two contracts—one for grading and the other for paving. Work on it started in May, 1947, and if autumn weather is favorable, the paving may be completed this year.

This Class 7 airport is being constructed for the Baltimore Aviation Commission of the City of Baltimore. The design of the field, as well as the supervision of the construction, is handled by the Baltimore consulting

By WILLIAM H. QUIRK,
Eastern Editor

engineering firm of Whitman, Requaardt-Greiner Co. & Associates. Both grading and paving contracts were awarded to C. J. Langenfelter & Son, Inc., of Baltimore on low bids of \$2,063,646 and \$3,243,729 respectively for the two phases of the construction.

Good Airport Material

Friendship International Airport occupies a 3,200-acre site in Anne Arundel County, 9 miles by motor car from the downtown section of Baltimore. Although the distance to the field is short, the driving time is now about 40 minutes, what with heavy traffic congestion through the business and industrial part of the city, followed by a rough ride over narrow U. S. 301 through a thickly settled string of small communities. Better access to the airport will be available if the proposed Washington-Baltimore Freeway is constructed. A connection from it can then be made directly with the terminal and also with the present Fort Meade Road, which formerly ran through the site but has recently been relocated around the western edge of the field. The airport is about 29 miles northeast of Washington, D. C., and 21 miles northwest of Annapolis, Md.

(Continued on page 85)

The photos below show equipment which C. J. Langenfelter & Son used on its Friendship International Airport grading contract. On the left, from top to bottom, a Lorain 82 2-yard unit, built to 2.7 yards, loading a 16-yard bottom-dump Euclid; a Super C Tournapull with an LP 12 to 15-yard Carryall on the left, and a Wooldridge 15 to 17-yard Terra-Cobra on the right; and a Tampo roller pulled by an Allis-Chalmers HD-10 tractor. At right, from top to bottom, a diagram of the grading-operations schedule on the Langenfelter contract No. 1 at the Baltimore airport; an Allis-Chalmers HD-14C with a Gar Wood 12 to 15-yard scraper at the left, and an A-C HD-19 with a Gar Wood 12 to 15-yard scraper on the right; a 3,500-gallon water tank mounted on a Mack truck, with gravity feed at the front and force feed at the center; and the "Big-Bertha" Porter super-compactor pulled by two A-C HD-19 tractors in tandem.

C. & E. M. and Essex Photo Service Photos

Three Plants at Job Site Make Hot-Mix for 10-Inch Machine-Laid Pavement; Local Aggregate in Base

★ THE two contracts—grading and paving—for the construction of the new Friendship International Airport at Baltimore, Md., were awarded to C. J. Langenfelter & Son, Inc., of Baltimore for a total low bid of \$5,307,375. The paving items of the second contract (\$3,243,729) were then sublet, on a joint venture, to two other contracting firms—the American Asphalt Products Co. of Washington, D. C., and the Bituminous Construction Co. of Baltimore. Paving got under way the middle of May, 1948, and will be completed by the end of this year, weather permitting.

A total of 688,000 square yards of bituminous paving is involved in the project. This includes three runways, a curved apron to accommodate twelve plane-loading positions, and a system of 75-foot taxiways around the edges of the runways to connect them with the apron. Two runways—northeast-south-

west and northwest-southeast—are paved to a length of 6,500 feet and width of 150 feet. The remaining east-west runway has an 8,000 x 200-foot pavement.

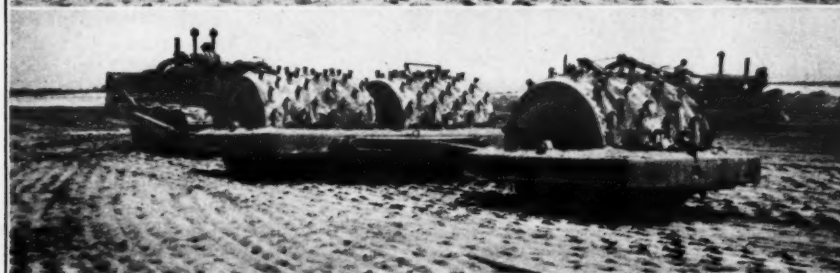
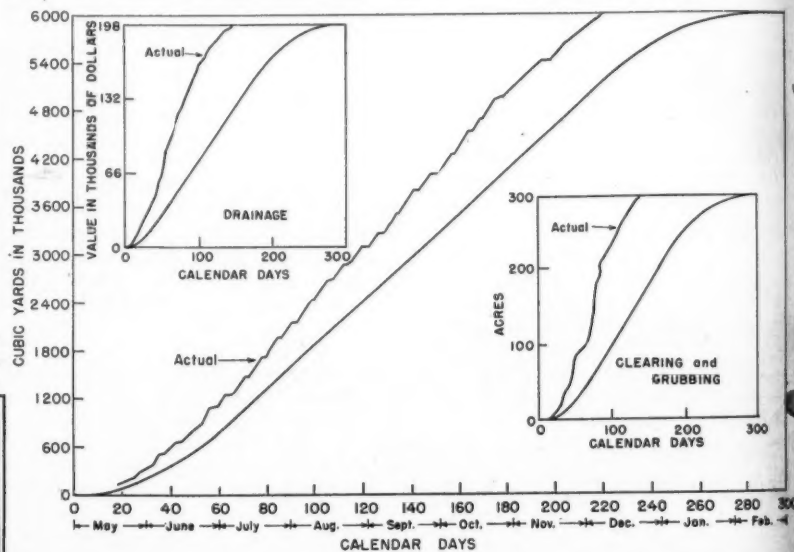
The runways are designed with a uniform paved thickness of 10 inches against both frost penetration and the most critical load that may be applied at any one point. The 7-inch base course of the pavement is laid in two 3½-inch layers using selected sand-gravel material from the grading for aggregate. Over this go two 1½-inch wearing courses—binder and surface—with abrasion-resisting stone for the coarse aggregate.

Three Asphalt Plants

The hot-mix is produced in three asphalt plants, set up at the job site just off the north end of the northwest-southeast runway. They have a total capacity of 290 tons per hour. The American Asphalt Products Co. contributed its 80-ton Cummer plant; the Bituminous Construction Co. sent its 100-ton Cedarapids plant to the airport; while both outfits purchased jointly for the job a new Barber-Greene continuous-mixing plant rated at 110 tons an hour.

Early this year the plants were assembled at the site and placed in a row 250 feet apart. The No. 1 plant, the Cummer, is at the east end; the

(Continued on page 94)



Massachusetts lays Texaco Asphaltic Concrete on another *major American highway*

Boston-Worcester Turnpike



(large photo) Resilient, joint-free Texaco Asphaltic Concrete on left side of Turnpike; old pavement, about to be resurfaced, on the other side.

(small photos) First and second courses of new Texaco Asphaltic Concrete surface, being laid by National Contractors Company, Inc., Somerville, Mass.



The Boston-Worcester Turnpike is, without doubt, one of the country's major highways. It connects the two largest cities of Massachusetts. Moreover, it carries much of the motor freight traffic moving between New York City and Boston.

This year, the state decided something must be done about the old concrete pavement at the Worcester end of the Turnpike. The type of improvement now being used is the same one employed widely and effectively by road builders for over a quarter-century. A resilient, heavy-duty Texaco Asphaltic Concrete wearing surface, constructed in two courses with a combined thickness of three inches, is being laid over the worn concrete.

The easy-riding, joint-free qualities of the new asphalt pavement will win the approval of Turnpike traffic. Also of interest to Massachusetts and other highway officials are the durability and low maintenance cost of Asphaltic Concrete, so conclusively demonstrated by past performance.

For your copy of a helpful booklet, which describes Asphaltic Concrete and the other Plant-mixed Types of Texaco Asphalt paving, write our nearest office.



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TEXACO ASPHALT

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Keep Politics Off the Highways

With elections just around the corner, now is as good a time as any to re-emphasize the need for keeping politics out of state highway departments. Everyone subscribes to this principle, except politicians—the ones too near-sighted to see that they would be helping themselves in the long run if they kept politics off the highways. For the business of running a highway department, or working for it, calls for clear logical thinking based on engineering principles, not on political demands.

Men who have very limited qualifications or none whatsoever for the office are sometimes elected or appointed to head highway departments. But they may overcome their deficiencies, or at least offset them, by appointing able assistants who actually run the department, while they themselves sit back and enjoy the publicity that comes their way. If they are smart, they do not interfere with an efficient staff by hamstringing it with politics.

But, unfortunately, there are a few states that use their highway departments as a means of building up a political machine. Employees are openly "advised" or "urged" to attend political meetings and rallies, with an implied threat to their status if they do not comply. No state that resorts to such practices can hope to recruit or hold top-grade engineers, inspectors, or skilled maintenance men. It is tactics such as these which cause professors in engineering colleges to counsel their undergraduate students to seek em-

ployment anywhere but in state highway departments.

Nor does politics affect only department personnel. The location of road construction and improvement, for instance, is not always determined by actual need, but by what political pressure can be exerted in behalf of a certain project. One section of the state may have much greater need than another for a new road, but if that area is politically hostile to the administration in power, it may well go begging.

The state—more specifically, each of its taxpayers—pays for such political finagling in higher costs. For the presence of inefficient, lazy, or downright dishonest personnel in the highway department results in higher engineering costs, far from satisfactory inspection of construction, and wasted maintenance dollars. Moreover, honest contractors shy away from bidding on jobs in suspect states. And as competitive bidding decreases, the cost of new roads is bound to increase. A vicious circle has been created and gets a strangle hold on the state.

Only if politics is kept out of highway departments can they be run honestly and efficiently. Top-caliber engineers and inspectors can then be attracted to highway work. With many contractors bidding for jobs, there is little chance of any chicanery creeping in. Good roads are so important to this country that we cannot afford to let even a few state highway departments fall under political influence.

Road Needs Discussed By AASHO-AGC Group

Several points of interest to contractors and engineers were brought up at a recent meeting of the Joint Cooperative Committee of The American Association of State Highway Officials and The Associated General Contractors of America, Inc., held in Portland, Oreg. Among the subjects discussed were means of cutting highway construction costs; the advancement of road construction in the west; increases in Federal Aid; subletting of contract work; and increased salaries for engineers.

Future highway construction costs can be cut appreciably, it was pointed out, if the American contracting industry is assured of a relatively large volume of work over a period of several years. To be effective, highway construction must be highly mechanized; it therefore requires a huge investment in equipment on the part of the contractor. The Joint Committee feels that better prices will prevail if contractors are assured of a sufficient volume of future work to make the investment worthwhile.

The Joint Committee is planning to push for an increase in Federal Aid when a new highway bill is placed before Congress—this in view of a recent survey by the AASHO indicating a need for \$22,000,000,000 of highway construction. The law passed last summer is seen as inadequate.

Despite the objection of some members, the Joint Committee went on record in favor of the regulation recently issued by the Public Roads Administration to permit a contractor to sublet up to 50 per cent of the work on Federal-Aid highways. The Committee sees the new regulation as increasing the number of highway contractors in the country. Those favoring it asserted that brokerage in highway construction will be avoided in most states by existing prequalification laws.

The subject of adequate salaries for highway officials and engineers also came up. The most effective way of securing such salaries, the Committee decided, will be for highway-contractor groups to appear before state legislatures to stress the importance of better pay for state highway employees. The contractors can work forcefully for needed changes that the highway officials cannot even discuss freely before the legislatures, the Committee concluded. The Committee also renewed its pledge to continue to secure more young engineers for highway construction and operation. A shortage of 12,000 civil engineers and sub-professionals in the United States was reported.

Book on How to Solve Urban Traffic Muddle

Traffic congestion is literally choking the life from the centers of American cities. To help solve this acute problem, a joint committee of three national groups has prepared a report which surveys the situation and recommends ways to meet it. The three groups are The American Association of State Highway Officials, the American Public Works Association representing city officials, and the Institute of Traffic Engineers representing specialists in the traffic field. The report, recently published by the Public Administration Service, is called "Traffic Engineering Functions and Administration".

Chapter I summarizes key facts and trends in highway transportation: the growth of highways, traffic volumes and speeds, traffic accidents; anticipated changes in highways, vehicles, traffic patterns, drivers, etc.; and the need for adequate traffic facts.

Chapter II describes how existing facilities operate. It lists the control

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measures available and in use—throughways, speed control, turning and parking regulations, one-way streets, signs, lighting, markings, signals, etc. It also describes structural changes such as roadway widening, elimination of bottlenecks, and so forth.

Chapter III discusses the development of new major facilities such as expressways, along with frontage roads and interchanges. Chapter IV stresses the kinds of traffic facts and interpretations needed in order to attack the problem. And Chapter V covers the administration of traffic engineering in state and city governments.

The report represents the official policies of the three sponsoring associations, and serves as a guide to effective engineering and administrative practices. It can be secured by writing to the Public Administration Service at 1313 E. Sixtieth St., Chicago 37, Ill., and asking for Publication No. 100. Price of the book is \$2.50.

Mack Dog Wins New Owner

Mack Road Builder, a pedigreed English Bulldog pup offered as the prize in an estimating contest at the Road Show, has taken up residence at his new home in Mendon, Mich. Thousands of visitors to the Road Show saw Mack at the Mack Truck exhibit and entered the contest. The object of the contest was to guess the number of turns the tailshaft of a giant Mack TRDX-51 transmission would make during the course of the Show. Estimates ranged all the way from 2,520 to 77,448,323,432 revolutions.

When the sealed counter was finally opened by Charles M. Upham, Engineer-Director of the American Road Builders' Association, the tailshaft was found to have made a total of 138,530 revolutions. Ralph Crosley, Road Commission Chairman, St. Joseph County Highway Department, R. R. 2, Mendon, Mich., made the closest guess—139,400 revolutions—and was declared to belong to Mack.



A big moment for Mack Road Builder, whom you all met at the Road Show. He'll soon know who his new master is to be, for Charles M. Upham, Engineer-Director for the ARBA, is about to announce who won the Mack Truck estimating contest.



Mighty River Spanned With Dry-Land Piers

**Piers Sunk to Bedrock
In Middle of Field for
Missouri River Cut-Off
Bridge; Air Is Used**

By **RAYMOND P. DAY,**
Western Editor

NEAR Kansas City, Mo., a gang of men is hard at work building a bridge. The new span, costing \$1,800,000, will cross the Missouri River. But the Missouri River is nowhere in sight. The bridge is being built in the middle of what appears to be a farmers' field.

The big concrete piers are being put down with the aid of pneumatic caissons. Cranes are swinging heavy loads. And the field office sits in the middle of where a river ought to be, considering that almost \$2,000,000 is being paid to cross it. The casual visitor, who expects to see a string of barges ahead of an Inland Waterways Corp. towboat, is astonished to see pick-up trucks and Caterpillar DW10's scooting around where a river should be.

The surveyors who laid the job out, however, were right. The bridge is where it ought to be. It's the Missouri River that's wrong. That's why the job is being done. When they get the bridge finished late this year, there will still be time to attend to the river.

Big Muddy Causes Trouble

For more years than veteran rivermen like John Barnhouse and Bill Earp care to remember, the Big Muddy has given trouble at the foot of Quindaro Bend near the mouth of the Kaw at Kansas City. As Tobe Maulding, another riverman, used to say before he died, "Let a damn jackrabbit spit in the river up at Omaha, and they'll have a flood below Quindaro".

Floods cause trouble—especially below Quindaro Bend where the Missouri swings hard at the big industrial district of Kansas City. When they get water from above, and a rampage on the Kaw at the same time, look out! The channel in front of Kansas City will handle 204,000 second-feet (bankful stage). The estimated discharge once—in 1844—was 625,000. Figure it out.

That is exactly what the engineers of the Kansas City District Office of the Corps of Engineers have done. Some study of the matter pointed the finger of suspicion on Liberty Bend, about 20 miles downstream from Kansas City. There, where the river belied north in a narrow, sharp horse-shoe bend, velocities slowed down and back pressure built up. The engineers got their heads together and came up with a solution. Eliminate Liberty Bend. Take the river straight on through the narrow neck in a gentle curve, and the velocity would increase.

Calculations indicated that with this done, the river would drop 2 feet in front of Kansas City and still carry the same amount of water from above.

The idea was incorporated in the Pick-Sloan plan for the Missouri River. Levees were added along the sides to give protection about 31 feet above Construction Reference Plane, an obfuscated term meaning "low water". And the thing was drawn up in plan form.

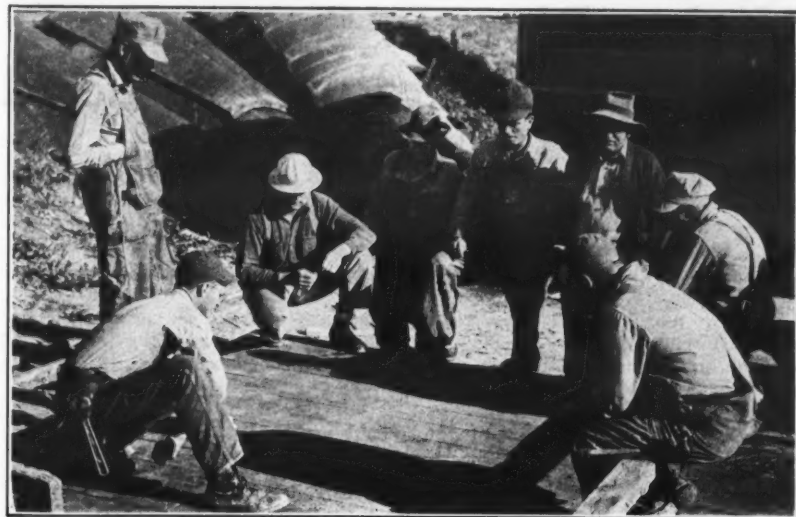
When the project was advertised, a joint-venture firm composed of Massman Construction Co. and the Kansas City Bridge Co. was low bidder with its \$1,800,000 figure. Preliminary designs, plans, and field studies were made by contract with the St. Louis consulting firm of Sverdrup & Parcel, Inc., world-famous bridge designers. An-

other contract was then entered into with Sverdrup & Parcel to act as supervising engineers, to take care of all engineering and inspection.

Work began officially on April 15, 1947, when the subcontracting firm called Midwest Precote Co., Inc., of Kansas City moved in to build a detour for the by-pass route of U. S. 71. Disastrous June floods hit hard. It was September 4 before the detour was in—months later than was expected. Tough, hard-bitten R. D. Bleich, General Superintendent for Massman and Kansas City Bridge, cussed mildly at the late start and got his gangs going to set up some of the equipment.

Organizing the Job

He set the job up on the basis of



C. & E. M. Photo

No Missouri River job can possibly be done without its pre-8 a.m. crap game.

an 8-hour day, 5 days a week. The exception to this rule was the case of

sandhogging under air. When that op-
(Continued on next page)

SOUTHWEST again resumes
the exclusive
production of
TYPE "S"
**4-WHEEL
SCRAPERS**

THESE SOUTHWEST 4-WHEEL SCRAPERS are unequalled for economy and efficiency in fast, low-cost dirt moving. Check these outstanding features • **FASTER, EASIER LOADING**—The "rear lift" method of control permits the bowl to lay flat when digging. The earth is "rolled into" the bowl instead of being forced "uphill". • **POSITIVE, ROLLING EJECTION WITH LESS POWER**—assures accurate control of spreading depth from a thin layer to a single heap. • **CUTS CLOSE TO BACKSLOPES, BUILDINGS AND RETAINING WALLS**—Cutting edge extends almost the entire width of the frame, permitting close, accurate cuts. • **SHORT TURNING RADIUS AT FAST SPEEDS**—Even load distribution, low center of gravity and balanced weight provide extreme stability. • **FINISHES SIDE SLOPES EASILY AND SAFELY**—There is no top-heavy superstructure to overbalance this scraper. It rides the slope as smoothly as on the level.

FOR DETAILED SPECIFICATIONS WRITE FOR BULLETIN CM-21

For the past eight years these scrapers have been manufactured and distributed under license from Southwest. From now on Type "S" 4-Wheel Scrapers will be manufactured and distributed under our own trade name, "SOUTHWEST". Hundreds of these scrapers are in use throughout the world—their reputation for efficient, dependable performance is well known.

CONSTRUCTION MACHINERY DIVISION
Southwest Welding & Manufacturing Co.
ALHAMBRA, CALIFORNIA



Mighty River Is Spanned With Piers on Dry Land

(Continued from preceding page)

eration was started, it worked around the clock.

For a crew of about 150 men at peak work, Bleich gathered a nucleus of key foremen. Three air superintendents came in. A labor foreman was hired. Two pile-driver foremen, a carpenter foreman, a reinforcing-steel foreman, and a master mechanic completed the ramrodding line-up.

Air—high and low-pressure air—was needed. Four big 500-cfm Worthington Blue Brute compressors, driven by Caterpillar diesels, arrived. They were set up in a shed about midway in the job, and headers were run out to the piers.

Several problems arose. How could four big compressors, putting air out at 110-pound pressure, supply the caissons with constant-pressure air, say at 38 pounds? Fisher Wizard valves were the answer—automatic devices which take air from the big surge tank and meter it out evenly to where sandhogs are working.

How could the four compressors be hooked together on a single header to unload at the same time, with any one of the four machines acting as the control for the other three? Worthington engineers came out to give the answer. A common control air line was laid under all four machines, and riser pipes installed. A rather intricate system of valves was put in, details of which Worthington now has. The size of the cylinders and springs on the throttle control rams was increased, and perfect multiple or individual con-

trol was achieved.

Now, when one of the machines needs service, minor repair, or a lubricating oil change, the master controls can be flipped in an instant to another machine, and no time is lost. All four machines or any combination of them discharge air to a common 6-inch header, which carries the air through a surge chamber before it goes out to the job.

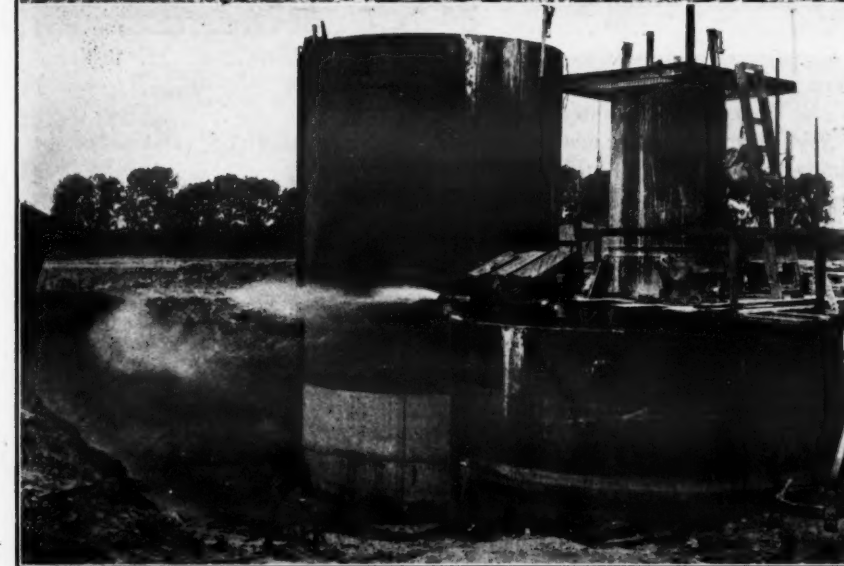
Other preparations included a small carpenter yard where 2-inch lumber was fabricated into concrete forms. A small CMC power saw was also set up there. Storage shops for supplies and materials were erected.

The Massman-Kansas City Bridge contract includes all substructure work: caisson and open excavation, concrete pouring, and reinforcing steel. The driving of sheet and bearing piles was in the contract. Structural-steel fabrication for the superstructure came to 4,050,000 pounds. Some of the other main quantities were 10,820 cubic yards of concrete; 537,000 pounds of reinforcing steel bars; 18,840 linear feet of steel 12-inch H-piles; 3,000 cubic yards of Class 1 pier excavation above elevation 710—the approximate low-water line—and 2,600 cubic yards below that elevation. About 132,000 cubic yards of embankment approaches to both end piers were subbed out to the Midwest Precote Co.

Bridge Design

Bridge design follows the same general pattern as the present Liberty Bridge across the Missouri River, ex-

In the picture just below, a sheepsfoot roller compacts approach embankment around a Missouri River bridge pier whose top nose protrudes into the photo, while the entire crane and pier line-up appears in the background. Below that is a general view of caisson work from above, showing water and sand being blown out the discharge pipe. At right, above, Fisher Wizard valves are installed at the air surge chamber to meter low-pressure air to the caisson. And at right, below, a Bucyrus-Erie 38-B crane equipped with a small sand bucket removes material from the cofferdam which appears at the left. C. & E. M. Photos



Data on Substructure of Bridge							
Pier No.	No. Piles	Length Piles	Seal Thickness	Elev. Top of Footing	Elev. Top of Icebreaker	Elev. of Bridge Seat	Total Height of Concrete Work
1	36	103	0	722.88	None	752.63	43 ft. 3/4 in.
2	28	82	4	698.80	710.80	741.13	46 ft. 4 in.
3	54	71	8	692.46	710.88	740.21	60 ft. 3 in.
4	---	---	7	695.00	725.00	774.01	161 ft. 1/2 in.
5	---	---	0	695.00	725.00	779.48	162 ft. 8/8 in.
6	---	---	7	695.00	725.00	773.88	138 ft. 10/2 in.
7	54	56	8	692.46	710.88	740.21	60 ft. 3 in.
8	28	79	4	698.80	710.80	741.13	46 ft. 4 in.
9	36	100	0	722.88	None	752.63	43 ft. 3/4 in.

cept that on this structure the deck girder from each shore rests on the bridge trusswork, and the truss steel in turn rests on the first offshore pier. Structural steel in the superstructure will be cantilevered, and short closures made at each shore.

The main river span on the new bridge will be 920 feet long, and will rest on a center pier. Total length of the structure is 1,883.5 feet. The deck will be big enough off the water to permit the highest steamboats on the river to pass. A few of the most important facts regarding substructure characteristics of the new bridge are indicated in the accompanying tabulation.

Open-Cofferdam Work Started

Foundations for piers 2, 3, 7, and 8 were built in the bottoms of open steel-sheet-pile cofferdams, and the sand dug out by clamshell buckets. The cofferdams were driven by a Lincoln-Dayton revolving crane and an American revolving machine, using a set of swinging leads and a McKiernan-Terry pile hammer. Bleich had a 10B3, a 9B2, and a

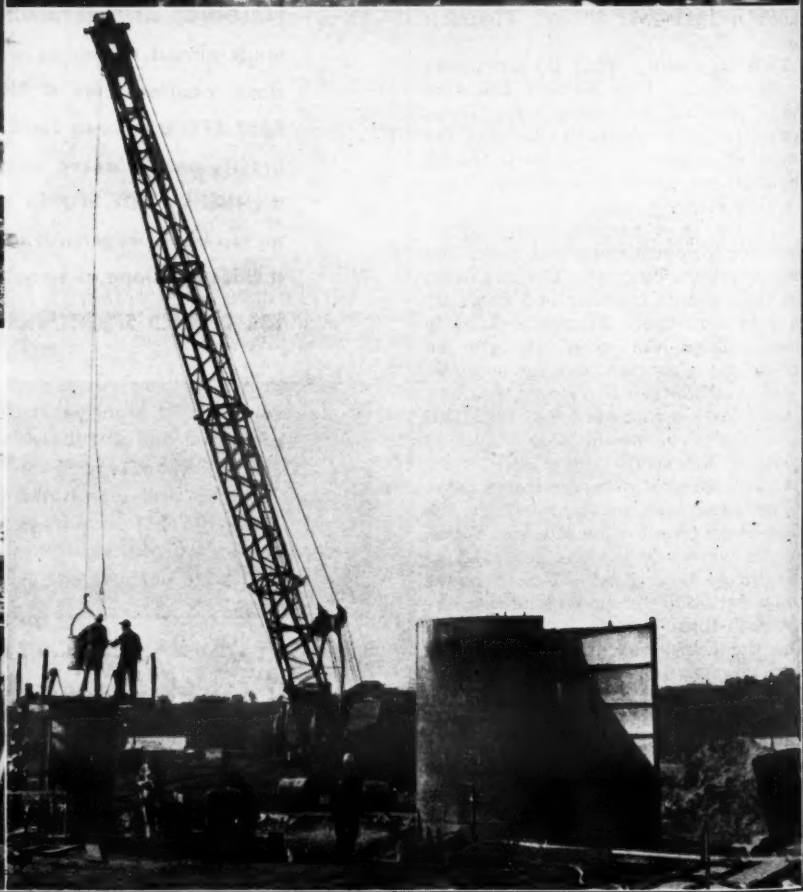
No. 7 to allow himself the versatility he needed. He used the 10B3 to drive the steel H-piles.

MZ-type sheeting was then set around a template of 24-inch steel members bolted together and stiffened by 10 and 12-inch steel struts. This template member was designed to be the first of several heavy braces inside the cofferdam when it was finished. It was laid level on the ground at the cofferdam location.

The sheet piles were then set around the steel and driven about 10 feet deep. Final driving down to grade was done after the piles had been initially set in place.

The sand and silt were then removed by a clamshell bucket on either a P&H 655-B machine or a new Bucyrus-Erie 38-B. As the sand was removed, the steel bracing template was lowered. After only a few feet the cofferdam tightened up sufficiently so the pile-driver men had to pick up one of the hammers on the crane and force the framework farther down. This was done with a free hammer, however;

(Continued on next page)





C. & E. M. Photos

In the first picture at left, a revolving crane clamps out an open cofferdam surrounding a pier of the Missouri River bridge. In the second photo, a carpenter crew erects wood concrete forms on top of one of the land piers; in the third, men work on one of the icebreaker forms; and in the fourth is Superintendent R. D. Bleich, who is standing beside a pier cofferdam.

no steam was used.

When the excavation reached the point shown on the plans, bearing-pile driving began. The steel templates had all been installed by this time, and the cofferdam was braced top and bottom.

The templates were so made that bearing piles could be set on location between the cross members. Each pile went down to a bearing of 60 tons. In some cases the big piles were driven to refusal on hard rock, with the 10B3 McKiernan-Terry pile hammer hitting 350 blows per inch of penetration at its rated speed of 110 blows per minute.

Some of the bearing-pile driving was done with water in the cofferdam, and in this case the McKiernan-Terry hammer submarined from 18 to 23 feet. Sterling pumps unwatered the hole after the concrete cofferdam seal was placed. The job had quite an assortment of these pumps for unwatering purposes: two 6-inch machines, three 3-inch, and one 2-inch pump.

Concrete came in by way of truck-mixers from a commercial producer near Independence, and was transferred to the hole by one of the cranes and a 1-yard Blaw-Knox concrete bucket. When the concrete piers were built up to the required elevation above low water, a Vulcan 400A pile extractor pulled the sheeting. Steam for pile driving and pulling, incidentally, came from a 125-hp locomotive-type boiler near by.

The nose forms above ground were made of 2-inch lumber, with double 2 x 4 wales on 16-inch centers. The main icebreaker forms were fabricated from 1/4-inch steel, and reinforced with steel ribs.

Caisson Work Under Air

The toughest parts of the job, however, were the three center piers which support the main span. All three of these piers will be in the limits of the river channel, and had to be sunk down to solid rock and keyed in.

Originally it was estimated that these piers could be open-dredged to a depth of about 75 feet, but the men beat this estimate a little. Except for a very slight variation in the order of pouring the icebreaker concrete, these piers were built in much the same way. Piers 4 and 6 were sunk in exactly the same way. So let's go out where the work is, and follow the construction on pier 4. Superintendent Bleich has the thing well organized, and the construction follows a set of steps, about as follows:

1. A crane and clamshell moves in, digs off the overburden down to the ground-water line, and backs away.
2. A labor crew then moves in; with the crane to help, they assemble the heavy conical-shaped steel cutting edge

(Continued on next page)



**DIRT MOVERS
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ON ANY earth-moving or construction job, dependable, low-cost tire performance is essential to a profitable operation. *Downtime is a profit killer.*

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Firestone OFF-THE-HIGHWAY TIRES



C. & E. M. Photos
P. B. A. Salim, above left, a visitor from India, listens attentively as C. E. Van Orman of the Kansas City USED office explains Missouri River bridge job. At right are Van Orman, Salim, and M. O. Smith, Kansas City Public Relations Coordinator.



Mighty River Spanned With Dry-Land Piers

(Continued from preceding page)

and put steel reinforcement in place. This piece of steel is 18 feet in diameter on its bottom cutting edge, tapering up to a 7-foot-diameter dredge well, in the center. Sandhogs call this shell the working chamber. In order to get the cutting edge started straight and true, some blocking may be necessary.

3. The 38-B Bucyrus-Erie rig, with a 60-foot boom and a 1½-cubic-yard clamshell bucket, then moves in to start the pier excavation. "Open dredging" is the term. After about 5 feet is excavated, the blocks are removed.

4. Outside steel forms, fabricated from ¼-inch steel and heavy steel rib reinforcements, are then brought up. Another of these outside forms is then installed, along with another section of dredge-well form. The first concrete pour is then made inside the outer forms and around the dredge-well form. Seven truck-mixers bring this concrete in at a stiff 1-inch slump, but the addition of Vinsol resin air-entraining agent at 10 per cent strength makes the concrete easy to handle.

The crane swings the buckets of concrete over; men dump the material and vibrate it with Ingersoll-Rand Model IV pneumatic vibrators. This, when completed, adds weight to the cutting edge, and readies the assembly for another 10-foot drop.

5. These excavations are then carried on in sequence until the cutting edge is far beneath the surface, and the concrete pier above it has grown until it is about 82 feet in length. At this point the open dredging work has gotten so difficult that it has to be discontinued. It's time to carry the pier on down to its final resting place with men operating down in the working chamber inside the cutting edge, under pressure.

6. Various shafts have to be installed now, because the open dredging shaft will have to be sealed off with a concrete plug to hold the air. A 32-inch-diameter man shaft is put in. We see a 36-inch supply shaft, two 4-inch compressed-air lines, a 4-inch blow pipe to carry sand up to the surface, a 2-inch water line, and a small ¾-inch whistle pipe installed. Once the dredging shaft is sealed, everything will be done by whistle signals.

A concrete plug 8 feet thick is then poured in the open dredging well around the shafts that have been installed. Airtight doors go in. On top of the concrete plug goes an entire outside cofferdam form, 18 feet in diameter and 22 feet 6 inches high. Now the job is ready for compressed air, and pneumatic work begins.

7. Safety rules go to work. They're tough, they're endorsed by the Associated General Contractors, and they mean exactly what they say. It takes 0.433 pound of air pressure per foot of depth to keep the water and sand from rushing into the working chamber—0.433 pound added to the normal atmos-

pheric pressure.

Sandhogs, if they are new or green, take the compression chamber in easy stages. The air pressure is run up 5 pounds, and they get a minute's rest to adjust themselves. If a man has a cold,

or sinus trouble, the resulting plug-up is most painful. Veteran sandhogs, however, are used to this pressure increase. If need be, they can "ride her through" without the adjustment period.

The amount of time they can work down there depends on the air pressure in the working chamber. Men work in pressures up to 50 pounds per square inch. Following are the rules in this matter:

Air Pressure	Working Shifts	Rest Period
Normal to 18 lbs.	two 4-hour shifts	½ hour
18 to 26 lbs.	two 3-hour shifts	1 hour
26 to 33 lbs.	two 2-hour shifts	2 hours
33 to 38 lbs.	two 1½-hour shifts	3 hours
38 to 43 lbs.	two 1-hour shifts	4 hours
43 to 48 lbs.	two ¾-hour shifts	5 hours
48 to 50 lbs.	two ½-hour shifts	6 hours

Coming up from this pressure, men have to decompress at the rate of about 1 minute per pound of pressure. Bends and paralysis are the price men pay for decompressing too rapidly, or staying down too long under air pressure.

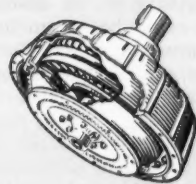
8. With the working chamber under air pressure from the big compressors, sandhogs run the sandy silt out the

blow pipe with the help of water jets. Surveyors check the pier constantly to make certain it's sinking true to line, and plumb. If it gets out of line, they have to use cribbing or shoring on one side of the cutting edge, and extra jetting on the opposite side, to bring it back in line.

Soon after pneumatic work starts, generally, some rock ledges are found. Gardner-Denver pneumatic drills go to work. From 60 to 65 holes are drilled about 42 inches deep all over the floor of the working chamber. The workers load each hole with 1 to 1½ sticks of 60 per cent gelatin, tie all the cap wires together properly, and run the lead-in wire up to the first lock about 80 feet above. The men all go up to the first lock, close the door against the lead-in wire, and explode the dynamite charge with the electric-light wires. The broken material is then taken out by muck buckets on the crane, through doors operated from the upper platform. The men below give

(Concluded on next page)

YOU SAVE MONEY AT *Both* ENDS with the hydraulic clutch



THERE'S relentless power back of the dipper of a 2-yd. Lorain-820—power that stays alive, "hangs on" in the most rugged digging, delivers more yardage per day. Yet the inevitable and unavoidable shocks and impacts resulting from such digging aren't "socked" into the turntable. The same Hydraulic Clutch that improves "hang on" and prevents engine stalling also absorbs and cushions shock—swallows up those strains and

stresses that can be so costly to cables and mechanism; reduces vibration to a minimum.

More dependable power at the dipper with minimum shock and vibration in the turntable—that's the two-way saving of the Hydraulic Clutch that has helped put the 2-yd. Lorain-820 right at the top among big yardage and profit producers. For complete information, call or write your local Thew-Lorain distributor.



THE THEW SHOVEL COMPANY • LORAIN, OHIO

Thew
Lorain 820

whistle signals to control the opening and closing of the lock doors.

This method of excavation is carried on until the cutting edge has landed well down in solid rock. Ordinarily the piers key about 3½ feet through shale into about an 18-inch key on solid rock.

9. Concrete sealing is next. The hole is dried up with the blow pipe. All ladders and equipment are removed. Concrete is then poured in 2-yard batches until the shafts are sealed up 50 feet above the rock. Compressed air is then held for about 48 hours and discontinued. The locks are removed, laitance cleaned away, and the seal completed to the top of the 82-foot piece of concrete. This completely fills it; the base of the pier is in its final resting place, and work can then be carried on above the ground.

10. An open sheet-pile cofferdam is then driven between the steel pier form shells, tying the two cylinders together. This is the first step in building the heavy icebreaker, which will protect the bridge piers against ice damage.

11. A clamshell then digs out the muck between the two shells, going down 8 feet. The two front halves of the steel pier form are then pulled, and steel wales and struts are placed between the sheet piles. Excavation is then completed to a point 7 feet below the top of the concrete piers, and a 7-foot concrete seal is placed. After this seal sets for 6 days, the cofferdam is unwatered, cleaned out, and the steel and wood icebreaker forms are installed. An 11-foot concrete lift is then added. The cofferdam is then shored against the icebreaker concrete, the lower-course steel struts are taken out, and another 9-foot pour is made. This brings it above the water line.

12. The shells and cofferdam are then removed. A final set of forms is installed, the top screeds carefully set and checked, and another pour is made to the final elevation of 725.

Each of these steps is necessary in the construction of the big piers. "But it's not as hard as it sounds," Bleich explains. "We're up on dry land here. Floods aren't likely to ruin us."

Concrete Work

All concrete for the pier work was carefully controlled by Sverdrup & Parcel technicians, and on days when the bridge was receiving concrete, no other material was batched by the commercial plant. The mix was designed on a basis of 5½ sacks per cubic yard, with a water-cement ratio of 5.4 gallon per sack. The mix was one part cement, 2.3 parts sand, 1.4 parts ¾-inch rock aggregate, and 2.35 parts 1½-inch rock. Air entrainment was figured at 4 per cent.

On big days when 200 to 300 yards had to be poured, about 8 truck-mixers were used by Stewart Sand & Material Co.

Under present arrangements, Kansas City Bridge Co. men are building the substructure, and the superstructure steel will be erected by Massman men. After the bridge is all finished, and bank-protection works built on the inside of the new river-bank curve, one of the 30-inch Government dustpan-type dredges will move in and dig a pilot channel. When the plug is removed,

the mighty Missouri will break down through its new course.

With a good fall and a short run, the muddy water will swirl like a millrace. The banks will begin to cut, and thousands of tons of sand and silt will move on down the river. By and by the new channel will be 900 feet wide, as planned. And the flood threat to Kansas City's important waterfront industrial area will be eased.

Personnel

Many people were responsible for this job. Among them are Colonel P. D. Berrigan, the Kansas City District Engineer, with L. D. McDonald as Construction Engineer and C. A. Philo as Resident Engineer.

Sverdrup & Parcel's interests in the work were actively managed by Raymond D. Bane, Project Engineer in the Kansas City area for Sverdrup & Parcel, with Frank A. Beets, his field representative, as Resident Engineer.

R. D. Bleich was in charge for the contractors.

"Decal" Identification

A rapid and uniform means of identifying or marking equipment is by the use of decalcomanias. One manufacturer of this type of material is Superior Decals, Inc., Ft. Worth Ave. at West-mount, Dallas 11, Texas.

The company points out that Super-Cals are made entirely of du Pont Dulux synthetic enamel, 0.004 inch thick. It states that this extra thickness allows for ease of handling and reduces waste at the time of application.

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4 Times the PRODUCTION for Peter Kiewit Sons' Co.



When this Athey Force-Feed Loader went on the job for Peter Kiewit Sons' Company at North Platte, Nebraska, a wheel-type tractor with a front mounted loader had been filling 4-yard trucks at the rate of one every 3 to 5 minutes. The Force-Feed Loader cut the loading time to **45 seconds** — increased the loads-per-hour from 15 to 60.

"The Force-Feed Loader is capable of picking up the windrow so cleanly that very little — if any — cleanup work was necessary behind it," reports H.

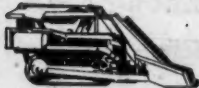
H. Selleck, Peter Kiewit Sons' Company, Superintendent. "We are certain the high production of the Force-Feed Loader saved us many hundreds of dollars in the removal of the subgrade material."

Athey Force-Feed Loaders set similar speed and cost records loading snow, oil mix, ripped-up paving, damp leaves, scarified macadam and many other types of material. Get more details from your Athey-"Caterpillar" Dealer, or write direct to . . .

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House-Building Cost Reduced by Welding

The use of arc-welding methods to reduce erection costs on residential buildings is a significant accomplishment during the present housing shortage. It is credited to the Schroedel Construction Co. of Milwaukee, Wis., presently engaged in erecting several 2-story apartment houses in the village of Shorewood, Wis. The project consists of constructing four 12-family apartment units, eight 16-family units, and one 24-family unit. Substantial savings are said to have been brought about by the use of arc-welded steel framing.

A modular design using 2-foot increments permits the use of shop-fabricated wall panels. Bethlehem open-web expanded steel studs were welded between a channel cap, or girt, and a sill plate for both first and second-floor panels. A 3/4-inch channel was added between studs for horizontal bracing. The wall panels were prefabricated in the shop and erected in the field with the use of arc-welding equipment manufactured by The Lincoln Electric Co. of Cleveland, Ohio.

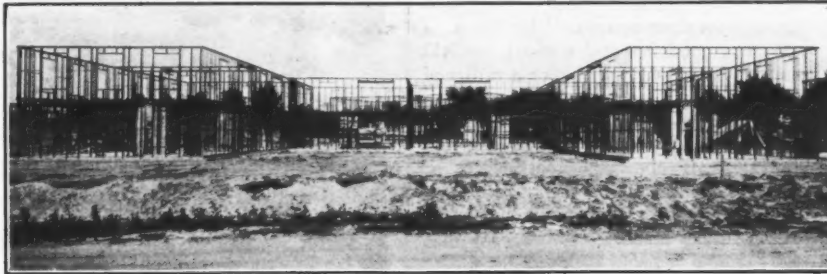
Before being welded in the field, the wall sections were raised into place with a hoist and clamped into position with an ordinary pipe clamp. The first-floor framing is welded into an integral unit without attachment to the framing by anchor bolts to the foundation. A finished concrete floor will cover the sill plates and hold the framing in position.

An I-beam, supported by two outside walls and the center utility-room walls, forms the center support for the expanded steel second-floor joists. No scaffolding is used in erecting the framework. Exterior walls will be finished with masonry. Interior plastering will be applied to metal lath welded in place.

The project will use 500 tons of structural steel, and the framing will require 2,000 man-hours for erection. The cost of each unit will be approximately \$7,000. The finished houses are designed to be shrinkproof and vermin-proof.

Trailers in Seven Styles

A folder describing its general line of equipment trailers is available from the Rogers Bros. Corp., Albion, Pa. This



Above is one of the multi-family apartment buildings which Schroedel Construction Co. is erecting in Shorewood, Wis., using arc-welded steel framing. The company reports a saving of 50 per cent, with this method, over masonry and fire-resistant construction. At right, a workman clamps steel stud panels in position and "nails" them together with a Lincoln arc-welding electrode.



folder features a description of the seven basic types of Rogers heavy-duty trailers. These are the Type S with 4 tires on a straight axle; the Type H with 8 tires on 2 transverse rocking axles; the Type T with 8 tires on 2 longitudinal rocking or walking-beam members with 4 stub axles; the Type D with 16 tires on 4 axles, and the I-beam or girder-type trailer with 8

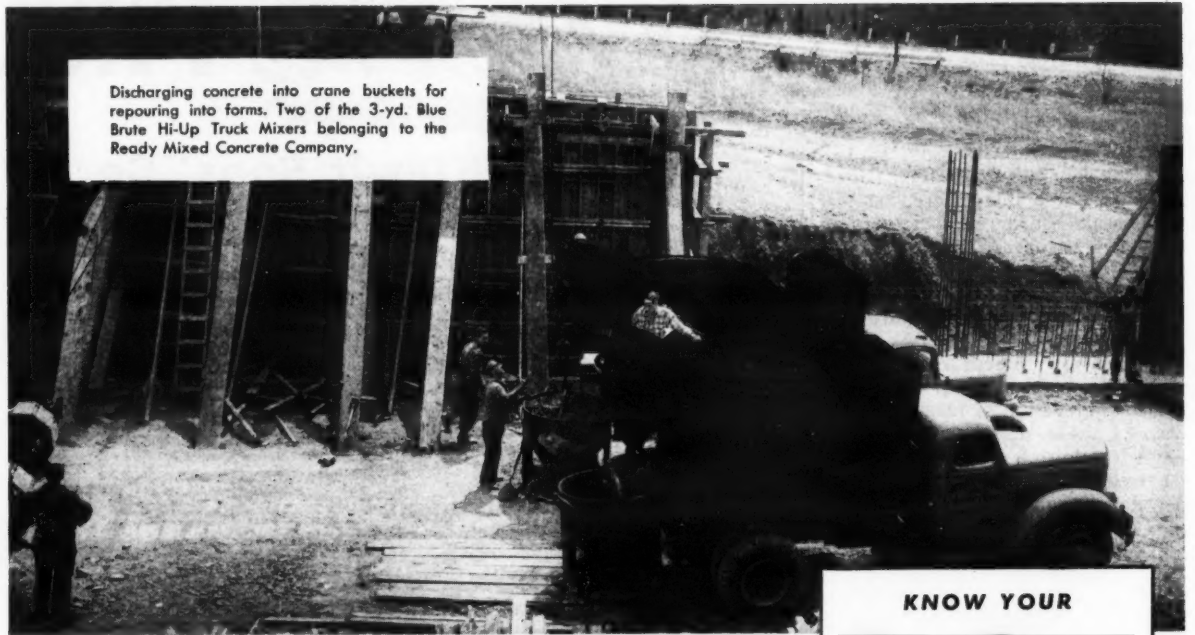
tires on 4 axles, so mounted as to enable the wheels to rock both transversely and longitudinally; the Tagalong trailer for small or medium loads; and the pole-type trailer with 16 tires, designed to be towed by any of the larger Rogers trailers.

The folder illustrates and gives a brief description of each of these units. It also discusses the Rogers frame construction,

the swinging side brackets, the dolly units, and the axle units.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 16.

HI-UPS HELP BUILD THE NATION'S HIGHWAYS



Discharging concrete into crane buckets for pouring into forms. Two of the 3-yd. Blue Brute Hi-Up Truck Mixers belonging to the Ready Mixed Concrete Company.

KNOW YOUR

BLUE BRUTES

Your Blue Brute Distributor will be glad to show you how Worthington-Ransome construction equipment will put your jobs on a profitable basis.

RANSOME EQUIPMENT

Pavers, Portable and Stationary Mixers, Truck Mixers, and Accessories.

WORTHINGTON EQUIPMENT

Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Self-Priming Centrifugal Pumps and Accessories.

WORTHINGTON



Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

Distributors in all principal cities

In every section of the country Blue Brute Hi-Up Truck Mixers are playing an important part in much needed highway construction. At Clinton Point, N. J., for example, these Blue Brutes are at work on a highway underpass and bridge on Route 28.

Owned by the Ready Mixed Concrete Company of Annandale, N. J., the Hi-Ups are carrying a total of approximately 5,000 cu. yds. of concrete to complete this job . . . and providing efficient, economical transport mixing with features like the following:

Ransome's exclusive mixing action . . . quick-charging hopper

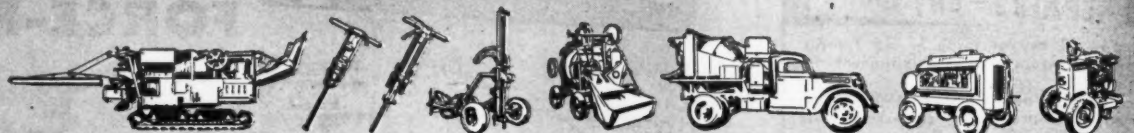
with non-jamming sealing door . . . simplified, trouble-free water system . . . simplicity of design with working parts easily accessible . . . and engineered flexibility that eliminates working strains.

Proved ability to mix better concrete at lower cost has made Blue Brutes familiar sights on highway and other big construction jobs of every type. It will pay you to learn how these Blue Brutes can help you save money and beat schedules. Get the whole story from your nearby Worthington-Ransome Distributor, or write for Bulletin 221.

RS-2



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IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

Cedarberg

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FLAME THROWER

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Cedarberg

Mfg. Co., Inc.

539 S. Fourth St., Minneapolis 15, Minn.



This 3-compartment aggregate bin is produced by C. S. Johnson for use with the Johnson Roadbuilder batcher. It is available in capacities of 50, 55, 75, 80, 120, and 125 cubic yards.

Aggregate Bin Has A Multiple Purpose

An all-purpose 3-compartment aggregate bin is produced by the C. S. Johnson Co., a subsidiary of the Koehring Co., located at Champaign, Ill. This bin is especially designed for use with the Johnson Roadbuilder batcher. It features an 11-foot-wide bin for fast charging, and bottom slopes set at an angle of 50 degrees to give fast clean-out of materials.

Used with one Hi-Speed multiple-material batcher, the Johnson bin is available in capacities of 50, 75, and 120 cubic yards. And in capacities of 55, 80, and 125 cubic yards, it can be used with two Hi-Speed multiple-material batchers to fill both compartments of 2-batch trucks simultaneously. The Johnson bins in the 120 and 125-cubic-yard sizes are shipped in two main sections; the smaller sizes consist of just one main shipping piece.

According to the manufacturer, the all-purpose bin converts readily into a low-cost ready-mix plant with the substitution of long leg sections, a cement roof section, and a truck-mixer weigh hopper. The roof section is available as optional equipment for one bin compartment for batching cement into trucks at the same time as aggregates. A bin can also be furnished with 2, 3, or 4 welded compartments of approximately equal capacity. For temporary set-ups, a steel-frame mat eliminates the need for concrete footings.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 89.

Data on Hydraulic Scrapers

A 4-page folder on the use of its hydraulic scrapers has been made available by the Henry Mfg. Co., Inc., P. O. Box 720, Topeka, Kans. It describes the 1 1/4-yard Model G-1, the 3-yard Model G-3, the 4 to 5-yard Model G-4, and the 5 to 6-yard Model G-5. The capacities listed are for heap loading.

The folder shows these rubber-tired scrapers in operation, and includes details on the materials they will handle, their recommended uses, and their features of construction and operation. A series of six pictures shows their one-man operation in digging, hauling, and dumping. A tabulated list on the back page of the folder gives complete specifications for all four models of Henry scrapers.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 12.

FWD Personnel Changes

Changes of personnel in its Engineering Division are announced by The Four Wheel Drive Auto Co. as part of its acceleration and development program. Donald B. Olen, formerly Chairman of the Manufacturing Committee, is now Director of the Engineering Division. H. B. Dodge, former Director, is now Technical Advisor to the management of the company. G. D. Simonds,

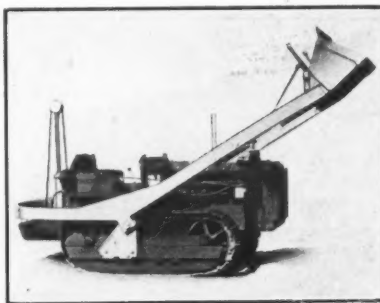
formerly Manager of Design Engineering, has been named Chief Engineer in Charge of Design of standard FWD models. B. G. Donley is Manager of Development Engineering. And James A. Sorenson, Metallurgist for the company for more than 30 years, has had added to his responsibilities those of Research Engineer.

Front-End Loaders

Front-end loaders for Caterpillar tractors are manufactured by the F. W. McCoy Co., 2 Santa Fe Drive, Denver, Colo. The Models L2 and L2-W fit the Caterpillar Model D2 40 or 50-inch-gage tractors; the Models L4 and L4-W loaders fit the Model D4 44 or 60-inch-gage tractors. And, according to the

manufacturer, no special attachments are required.

The L2 and L2-W have a 7-foot dumping height, an 8-foot 5-inch lifting height, a bucket width of 48 inches, a dumping clearance of 3 feet 6 inches, a rated capacity of 3/8 cubic yard, and a shipping weight of 1,500 pounds. The L4 and L4-W have a 7-foot dumping height, a 9-foot lifting height, a dumping clearance of 3 feet 7 inches, a bucket width of 54 inches, a rated capacity of 1/2 cubic yard, and a shipping weight of 2,300 pounds. All four models have a rotary-type hydraulic pump which is driven from the fan belt. Positive control is said to be available at any point through the cycle. The hydraulic cylinder, with lift cable attached, is mounted on the rear draw-bar platform.



The McCoy Model L4 front-end loader—shown here mounted on a Caterpillar D4 tractor—has a rated capacity of 1/2 cubic yard.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 57.



(Above) Model TD Rear-Dump Euclid. 22 ton capacity... 14.8 cu. yds. struck measure... loaded top speed 31.2 m.p.h.... powered by 225 or 275 h.p. diesel engine.

(Below) Double-acting twin hoists and entire hydraulic system are of Euclid design and manufacture. Action is fast and positive enabling operator to control body position at all times.



REAR-DUMP EUCLIDS are engineered and built for lasting strength. Their ability to stay on the job day after day, means more tons moved at lower cost... "plus" performance for owners.

Model TD Euclid body has extra thick plates reinforced with heavy box section side and bottom supports. The rugged frame is built to stand the jolts of hauling 22-ton loads. That's why it can take the pounding and wear of loading ore, coal, overburden and heavy excavation by large shovels and draglines.

Some other "plus" features that make the Model TD Euclid unequalled for long-life and continuous performance are large capacity... ample power and traction for steep grades and tough roads... good speed on the haul road and full-floating, double reduction planetary type Euclid axle.

If you want economical operation and equipment best suited to your hauling needs, see your Euclid distributor or representative.

The EUCLID ROAD MACHINERY Co. Cleveland 17, Ohio





C. & E. M. Photos

The overall view, at left, of the deep cut for the Missouri Pacific Railroad line change shows a Marion 111-M in the right foreground, with two Northwest 2½-cubic-yard machines, all loading rock to the fleet of hauling equipment. Surveyors in the foreground check the slope. Above, a Northwest shovel loads a bottom-dump Euclid as a Dixon wagon waits.

Deep Cuts Highlight Railroad Relocation

(Continued from page 1)

On cut sections the trees were cut down the same way, but the stumps were either pulled by the Caterpillar tractors or dug out by the excavating equipment. The brush was piled and burned as clearing went on.

Excavation Work

The contractor started excavation work at the top of the cuts, where the working area was wide, and took out the material in 10½-foot-deep layers. When one layer was finished, machines dropped farther back to a point where the next 10½-foot cut intersected the contour line. The slope, or grade, was maintained on all cuts. Thus as the width of cuts narrowed down towards the bottom, the length increased, and the machines were seldom crowded for working space.

One of the problems of the job was the material encountered. It ran the gamut of practically everything in the southern Ozarks, from glassy-hard porphyry to streaks of soft rubbery clay. Gray limestone, clay and boulders, clay with shale streaks, coarse sand, and chert boulders were a few of the materials the machines exposed.

The contractor set the job up for power-shovel loading and long-haul work by fast rubber-tired hauling equipment, because the average haul was about a mile, taking into account the material placed in the drainage system. Extreme hauls were 18,000 feet. Output for the job was based on an estimate of 800 cubic yards an hour loading capacity of three power shovels. A Marion 111-M was estimated at 300 cubic yards an hour, while two Northwest 80-D shovels were figured at 250 cubic yards an hour each. A 4-yard Amsco dipper was used on the Marion rig, while 2½-yard Amsco dippers saw service on the Northwest shovels.

Hauling equipment included ten new Dixon bottom-dump wagons, pulled by Dart tandem-drive tractor-trucks with Timken rear ends, hydraulic steering, and Hercules diesel engines. These machines hauled 16 yards to the load. Their speed, loaded, was up to 45 mph.

Seven bottom-dump Euclid wagons of 16-cubic-yard capacity, pulled by Euclid prime movers powered by 200-hp General Motors diesels, were used. The hauling fleet also included six 11-yard White end-dump rock trucks and three Caterpillar DW10's with bottom-dump 11-cubic-yard wagons.

Auxiliary equipment in connection with these units was needed to patrol the haul roads, sprinkle the dust on them, and level dumped material. Five Caterpillar D8's with bulldozer blades saw service on the fills, and a 3,000-gallon water tank truck was used on haul roads to keep the dust down. Water came from a small creek midway in the job, and was pumped to the

truck for sprinkling.

Fast rubber-mounted hauling equipment needs good roads if it is to reach maximum speed. A Caterpillar No. 12

motor grader kept the cut floor smooth and level, and one No. 12 Caterpillar did nothing but dress the haul road between the shovels and the dump.

Constant blading was necessary to keep the fill smooth.

When the shovels began to dig and

(Continued on next page)



MAINTENANCE SAVINGS EVERYWHERE — Texaco Rustproof Compound can save maintenance costs not only on contractors' equipment, but on gas holders, waterworks, sewage disposal plants, bridges — wherever metal is exposed to weather, or most of the corrosive chemicals and fumes. Read the whole money-saving story in Texaco's 36-page book "Rust Prevention." Send for your copy today.

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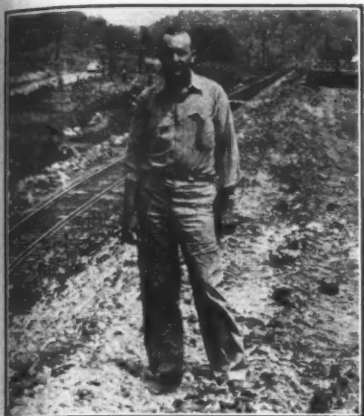
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C. & E. M. Photo
Superintendent L. C. Brown stands on top of the fill, above the present Missouri Pacific tracks.

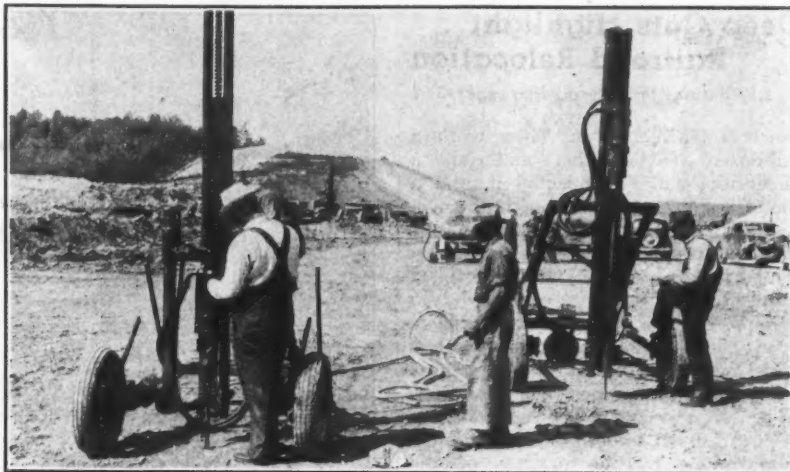
load the haul wagons, the abrasive nature of the material showed up. The best shovel teeth, hard-faced with welding rod, lasted only one 10-hour shift, and even at that they had to be

turned around in the middle of the shift. Some H&L shovel dipper teeth were then ordered, and tooth life immediately doubled. The teeth lasted a shift, were turned around, and lasted a second shift. But the material wore even these teeth down in 20 hours.

Working against a 10½-foot face, the shovels loaded the material day and night. Fills began to grow. The excavation bosses on the two shifts kept the hauling equipment synchronized under the shovel dippers according to the capacity of the machines in whatever formation they were digging. Slices of the hills began to disappear, and the fills started to rise. Then trouble struck.

Material that had promised to dig reasonably well began to stiffen up. Although only 7,000 yards of the first 1,120,000 cubic yards removed were classified as solid rock, the character of the material was impeding progress. Nature was fighting back, and the punishment she dished out to the shovels was hard to take.

They did not have to take it long,



C. & E. M. Photo
Behind these Chicago Pneumatic and Cleveland wagon drills on the Clarkson job are a Chicago Pneumatic and a Jaeger Air Plus compressor which furnished air for the drills, as well as a Northwest shovel and Dixon wagon at work in the cut.

however. The contractor brought in blasting powder by the carload, and the equipment to put it down.

Drilling and Shooting

A new Jaeger 600-cfm Air Plus compressor and two 500-cfm Chicago Pneumatic machines came in. Two Cleveland and three Chicago Pneumatic drills were shipped in, too. Incidentally, one of the contract provisions granted free freight transportation to equipment and supplies sent in over the Missouri Pacific railroad.

Since the material was too heavy and wet to blow out of a 12-foot hole, Superintendent Brown had special 7½-foot steel made up for the wagon drills by the O. B. Avery Co. of St. Louis. Timken detachable rock bits were brought in, and the big 2⅞-inch-diameter size was used to start the holes.

Drill footage varied from 100 to 500 feet in 10 hours. In one soft formation a drill bit lasted 20 feet before it lost its gage. Not 30 feet away, in a chunk of hard porphyry, four bits were ruined in 20 inches. As a general rule, a bit lasted about 10 feet; however, it lost its gage rapidly in that amount of drilling.

The bits were sent out to Cardin, Okla., to the Bit-Co Co. for resharpening, but they were good only for one such resharpening. When they dropped in size to 1¼ inches, they had to be discarded because the powder cartridges were 1½ inches in diameter.

Holes went down the full 7½ feet on a straight 8-foot-square grid pattern. Seams, variations in material, and clay pockets dogged the drillers. But they managed nonetheless to stay out ahead of the shovels.

In the hard, flinty material, about 4 pounds of 40 per cent Giant gelatin powder was used per hole, without any springing. For the looser and softer formations, Atlas Apocodyn No. 16 at about the same rate gave excellent results. Generally speaking, the explosive ratio was ½ pound of powder per cubic yard.

The shots were pulled with No. 6 electric blasting caps in each hole, hooked together in parallel, and set off with a hand blasting machine. The biggest shot consisted of 3,400 pounds of powder. When the shots were made, the chunks of material seemed to rise about 2 feet, disintegrate, and fall back. Very little secondary shooting was necessary, but occasionally the shovels kicked out an oversize boulder which had to be re-drilled with jackhammers and broken with a stick of powder.

Along the slope lines, extreme caution was used to prevent shattering beyond the face. A few places where clay seams were found showed indications of instability, and Brown did not wish to precipitate a bad slide.

Making the Fills

The use of powder boosted shovel production back to normal, and soon the hauling wagons were again snowing under the spotters out on the dump. A strip of fill about half the total width was first dumped for a dis-

(Concluded on next page)

FIGHT RUST

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Rustproof Compound

Deep Cuts Highlight Railroad Relocation

(Continued from preceding page)

tance of 100 feet or so. Then, while a bulldozer leveled this material, a sheepsfoot roller compacted it, and a motor grader dressed it smooth, the machines dumped on the other side. In this manner a smooth haul road was maintained right up to the end of the fill at all times.

Dirt went in in thin 6-inch lifts; some of the material contained small boulders which were worked into the lifts; large boulders were dropped over the slopes of the roadbed. In any case it was rolled, dressed smooth, and then rolled some more by the passage of the heavily loaded hauling equipment. A few loads of rock riprap from the solid rock portions of the cut were also end-dumped by the White trucks, especially down along a small stream which paralleled part of the fill. This gave much-needed protection.

The final railroad grade as shown on the plans was carried through on the fills at the time of construction, regardless of their height, as a precautionary measure to aid drainage. It paid dividends, too. Bad weather from November, 1947, to March, 1948, dogged the job, but the water drained away and the equipment worked many a day when it might easily have been tied up if drainage had not been good.

Maintenance of Equipment

A crew of only 5 mechanics by day and 2 on the night shift kept all the 47 units of heavy equipment operating at top speed. The main yard, about 5 miles south of Ironton, was set up along a spur line from the railroad track. Equipment and materials could be shipped in there and easily unloaded.

A metal-clad shed about 40 x 100 feet was set up, and heavy repairs were made inside. The south side of the shed was left open. Steady electric power for this shop was furnished by a new Witte Dieselectric plant, with a Witte 10-kva generator. Other equipment seen around this shop included a Lincoln arc welder, oxyacetylene equipment, a Sioux heavy-duty drill, a Rodgers hydraulic press, and heavy-duty Snap-on tools. The easterly quarter of the shed was used for a parts room.

Heavy repairs were made at the shop, and minor operating repairs in the field. A portable service truck called on every piece of equipment once a shift and gave it fuel and grease. Engine crankcase oil in the power shovels was changed twice a week—once a week in the hauling-unit engines. Even the sheepsfoot rollers came in for special service once every two weeks, because the abrasive material wore down their tamping feet. Hard-facing rod built them back up.

Safety

Missouri Pacific trains running past the job operated under a 15-mph slow order through proximity zones where fills were adjacent to or above the old line. Equipment worked on the edge of the fill only in the daytime, between trains, and put up a barrier of earth about 3 feet high. Four men stayed on



C. & E. M. Photos

In the deepest cut of the railroad-relocation job, two surveyors at left take check shots 55 feet short of final grade. And as workmen keep stones off the Missouri Pacific tracks (photo above), heavy equipment builds the fill higher and higher.

the slopes to keep the tracks clear of any boulders, and flagmen were also stationed there. At night, and in the daytime when trains were passing, the

equipment worked towards the inner side of the fill.

In addition to personnel mentioned previously, Clarkson Construction Co.

was represented by Master Mechanic Forrest Dillon, Night Superintendent A. C. Krage, and Office Manager Ellis Griffith.



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It's a great time-saver—fast on the road, fast on the job. Notice how the boom nestles horizontally for transport, and how it reduces overall height. Boom can be tilted onto saddle quickly and easily without using a wrench. Takes only a few minutes to get ready to move.



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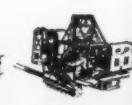
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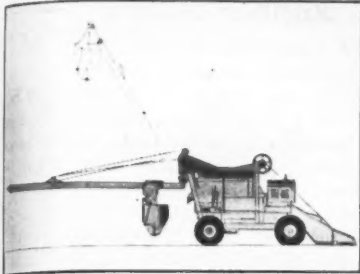
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Designed for jobs requiring a small maneuverable paver, the Koehring 16-E paver has a maximum operating capacity of 48 to 50 cubic yards an hour. It features an elevating boom.

New Light-Duty Paver Has 50-Yard Capacity

A new 16-E paver was shown at the Road Show by the Koehring Co., 3026 W. Concordia Ave., Milwaukee 10, Wis. The unit is for use on jobs requiring a small, maneuverable paver, such as highway-widening projects of from 2 to 10 feet; city paving jobs involving an area of a few blocks; for building contractors and bridge-construction work; and for irrigation and small drainage-canal concrete linings. An elevating boom tower is designed to permit raising concrete to high forms.

The Koehring 16-E Twinbatch paver has dual wheels on the discharge end and single wheels on the charge end; they are equipped with pneumatic tires. It is said to move from job to job at traction speeds of up to 8 1/4 mph. Maximum operating capacity is listed at from 48 to 50 cubic yards per hour, based on a 60-second specification.

Among the features claimed for the Koehring 16-E are the 2-compartment drum with overlapping action and automatic controls; an oscillating boom that permits a 180-degree angular working range; autocycle mixing operation controlled by the Koehring Batchmeter; a timing device designed automatically to lock the batch in the 2-compartment drum for a predetermined interval; and an accurate siphon-type water tank for control of water-cement ratio.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 56.

New Heater for Water

A compact hot-water heater for use by contractors is manufactured by the Rempe Co., 340 N. Sacramento Blvd., Chicago 12, Ill. This contractors' heater is designed to deliver up to 200 gallons of water per hour at a temperature of 180 degrees F. It can also be used to heat compressed air, the manufacturer states.

The heater's shell is made of 14-gage steel and is seam-welded. The coil is 1-inch steel pipe, 90 feet long. The outlet and inlet are set to match the thread on 3/4-inch hose. Outside diameter of the shell is 22 inches. The unit is 36 inches high, and handles are provided for carrying it. The Rempe heater will burn coal, coke, wood, refuse, etc.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 20.

Film on Rock Excavation

A 16-mm film in sound and color on rock-excavation projects has been prepared for distribution by the Gardner-Denver Co. of Quincy, Ill. The film is designed to present dramatically rock drilling, blasting, mucking, and other phases of construction work. It shows grade preparation for a major highway, as well as canal, tunnel, and dam excavation.

The film is free of advertising and is available for showing to schools, engineering societies, and other organizations. Showing time for "Man Against Rock" is 33 minutes. Interested parties should write to the company for further information.

Flexibility Is Stressed

In Aggregate-Plant Data

A 20-page catalog on portable crushing, screening, and washing plants has been issued by the Iowa Mfg. Co., 916 N. 16th St., Cedar Rapids, Iowa. Featured in the bulletin, which is designated Unit 2, is a description of the four basic sections which make up Unitized plants—primary crushers, scalping units, secondary crushers, and wet or dry screening units. It also explains how these units can be combined to form plants which will produce from 25 to 250 tons of material per hour, from riprap stone to fine aggregate.

The bulletin gives detailed information on each of the basic units, including the sizes in which it is made, its dimensions and specifications, horsepower requirements, materials and sizes of materials it will handle, and other pertinent information. Flow diagrams illustrate the passage of material and the degree of reduction obtained at each step.

The catalog illustrates several set-ups for producing various sizes of aggregates; set-ups with various types of power—electric, gasoline, or diesel; set-ups with various types of feeding equipment—shovels, conveyors, draglines, trucks, or bulldozers; and a large 2-page spread showing how to determine the approximate area needs for a Unitized plant set-up.

Copies of this literature may be ob-

tained from the company. Or use the enclosed Request Card. Circle No. 77.

Hurley, Sr., of Thor, Dies

Neil C. Hurley, 78, Chairman of the Board of the Independent Pneumatic Tool Co., died recently following a heart attack. Mr. Hurley was succeeded as President of the Thor organization in 1944 by his son, Neil C. Hurley, Jr.



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New Models Augment Varied Scraper Line

A hydraulically controlled 3.6-yard scraper and a cable-controlled 21.2-yard scraper are announced by the Caterpillar Tractor Co. of Peoria 8, Ill. The smaller No. 40 scraper is for use with the 43-hp Caterpillar D4 track-type tractor; and the Model No. 90 is for use with the D8 track-type tractor as a prime mover and the D8 or D7 for push loading.

The No. 40 is the only hydraulic scraper in the Caterpillar line. It is equipped with four hydraulic cylinders—one for the bowl, one for the ejector, and two for the apron lift. It is designed for use with the Caterpillar hydraulic system through connecting lines leading from the pump to the rear of the tractor. It has a struck capacity of 3.6 cubic yards and a heaped capacity of 4.5 cubic yards; it will provide a 6-foot cut. Overall length is 21 feet ½ inch and width is 7 feet 5½ inches. The unit has a wheelbase of 13 feet 10 inches and requires 19 feet for a non-stop turn. Shipping weight is 7,380 pounds.

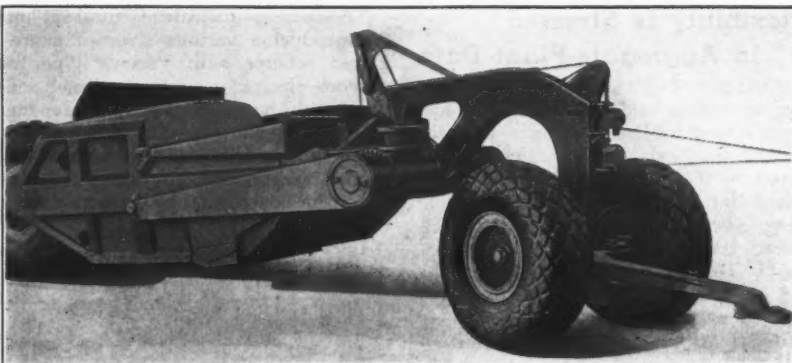
The No. 90 has a struck capacity of 21.2 yards and a heaped capacity of 27 yards, based on a 1 to 1 slope. Overall length is 40 feet, width is 12 feet, and height is 10½ feet. The scraper has a wheelbase of 25 feet 3¾ inches, and requires 31 feet 7 inches for a non-stop turn. Front tread is 81 inches; rear tread is 86 inches. The unit has a shipping weight of approximately 34,000 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 100 if you are interested in details on the small No. 40 scraper; No. 101 for the large No. 90 model.

Trucks: Conversion Units

Literature describing the Coleman line of 4-wheel-drive trucks and 4-wheel-drive conversion units has been prepared by the Coleman Motors Corp., Littleton, Colo. One bulletin describes the Coleman Model G-55 truck; one describes the 4-wheel-drive conversion unit for use with Ford trucks, Models F-2, F-3, F-4, F-5, and F-7; and a third describes the conversion unit for 1½ and 2-ton Chevrolet trucks.

The truck bulletin shows a front view and a side view of the Model G-55, and features a list of condensed specifications on its engine, frame, ignition sys-



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tem, transmission, body, wheels, brakes, and so forth. The bulletins on the conversion units describe their front-wheel assembly and the special transfer case which features a 2-speed auxiliary transmission with a manually controlled locking differential. The bulletins also describe the special features and ap-

plications of these units.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 29 for the truck bulletin; No. 30 for the one on conversion units for Ford trucks; and No. 31 for the bulletin on conversion units for Chevrolets.

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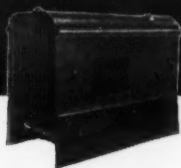
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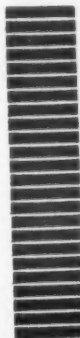
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Lock Foundation On Timber Piles

**New Structure to Be Part
Of 9-Mile Alternate Route
Of Intracoastal Waterway
In Southern Louisiana**

(Photo on page 1)

OVER 5,000 timber piles have been driven as a foundation for the new Algiers Lock which is under construction in southern Louisiana. The lock is being built on the flatlands of Orleans Parish, behind the great levee on the right bank of the Mississippi River below New Orleans. The project is under the direction of the Corps of Engineers, Department of the Army, New Orleans District.

Eventually, when a new 9-mile canal is dug to its rear, the lock will be part of an alternate route of the Intracoastal Waterway. The present Intracoastal Waterway, cutting across the lower coastal fringe of the state from the Sabine River in Texas, joins the Mississippi through the Harvey canal and Harvey Lock located across the river from New Orleans. Water traffic may then continue downstream to the Inner Harbor Navigation Canal below the Crescent City. This canal connects the Mississippi River with Lake Pontchartrain and the continuation of the Intracoastal Waterway across the Gulf States of Mississippi, Alabama, and Florida to the east.

The importance of this lock at Harvey, La., to shipping on the Intracoastal Waterway is tremendous. Though designed and constructed to take care of about 6,000,000 tons of shipping a year, the lock has actually been handling twice that amount. Consequently, an alternate connection to the Mississippi has been sorely needed to supplement the existing waterway, and thereby eliminate the bottleneck in water traffic at the Harvey Lock. Furthermore, should anything happen to interrupt the operation of the Harvey Lock, for even a short period, the effect on shipping would be felt all along the Gulf Coast.

Algiers Lock

Known as the Algiers Lock, the new structure is actually 7 miles downstream from that section of New Orleans known as Algiers which lies on the right bank of the Mississippi opposite Canal Street. With this location, it will not spill Intracoastal Waterway traffic into the river along the New Orleans harbor as is now the case with the Harvey Lock. Moreover, future water traffic will have a comparatively straight stretch of river to negotiate from the Algiers Lock upstream to the canal leading to Lake Pontchartrain. At present, shipping which leaves the Harvey Lock must maneuver around the famous crescent in the river, which is

really a reverse curve, as it sails downstream to that same connecting canal.

Besides the lock now under construction, the overall project includes the digging of the 9-mile canal back to the Intracoastal Waterway, the construction of two new highway bridges and a railroad bridge, and a new drainage-system

layout. The latter will be required because the new navigation canal, which will have a 125 x 12-foot cross section, will cut across a series of other canals including three main drainage ditches which lead to pumping stations.

The total length of the new structure will be 1,129 feet 10 inches, including

the lock, gates, forebay or river approach end, and the tailbay or canal approach end. The lock chamber will measure 800 feet long between the gates, and will be 75 feet wide. Its reinforced-concrete floor will have a total thickness of 7 feet 6 inches, with the

(Continued on next page)

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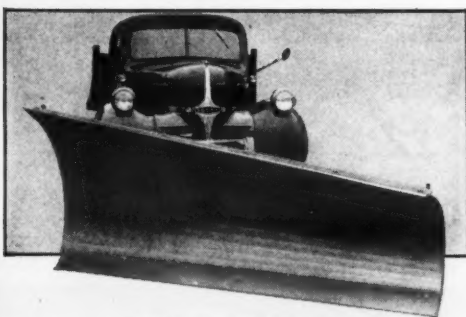
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New Lock Foundation Built on Timber Piles

(Continued from preceding page)

timber foundation piles projecting 6 inches into the concrete. The side walls, also of reinforced concrete, will be 6 feet thick at the base, tapering to 2 feet at the top. The elevation of the bottom sill is minus 13.0 Mean Low Gulf, while the top of the walls is at plus 23.0 elevation, making them 36 feet high.

At either end the gate bays will be 87 feet 5 inches long, and 194 feet across, and will be equipped with sector-type gates. The concrete floor will be 10 feet thick.

Several Contracts

So far three contracts have been awarded in the construction of the Algiers Lock. The first was for the structure excavation; the second, which is described in this article, covered the foundation piling; and the third involves the reinforced-concrete floor. No contracts have been let as yet for the concrete walls or the canal excavation.

The first contract for excavation was awarded to Inland Construction Co., Inc., of Memphis, Tenn. Its low bid of \$163,799 covered some 370,000 cubic yards of excavation. Work started in June, 1947, and was completed in November.

Also in June, 1947, the Keller Construction Corp. of New Orleans, La., was awarded the second contract to drive 277,700 linear feet of round timber piling for the lock foundation. The low bid was \$199,851. About 4,075 square feet of steel sheet piling for cut-offs at both ends of the lock was included in the contract. This entire contract was sublet to Byrd & Bruns Bridge Co. of New Orleans. Pile driving began February 19, 1948, and the last of the piles was driven this past July.

Work on the reinforced-concrete lock floor got under way in June, 1948, with another New Orleans firm, Stevens Brothers, and The Miller-Hutchinson Co., Inc., holding a \$1,053,410 contract. The principal items in the estimate included 30,500 cubic yards of concrete and 7,000,000 pounds of reinforcing steel. The floor is expected to be completed early next year.

Government Work

Government forces also had a hand in the work at the very start of the project when they dug a flotation channel from the Mississippi through the great right-bank levee out to the job site. This permitted the excavation contractor, Inland Construction Co., Inc., to move in its 10-inch hydraulic dredge Grisley and dig the foundation hole hydraulically.

The latter method was more suited to the soft, low-lying terrain, and was also more economical. The elevation of the ground at the job site behind the levee varied from 0 to plus 3, while the levee crest is plus 20.

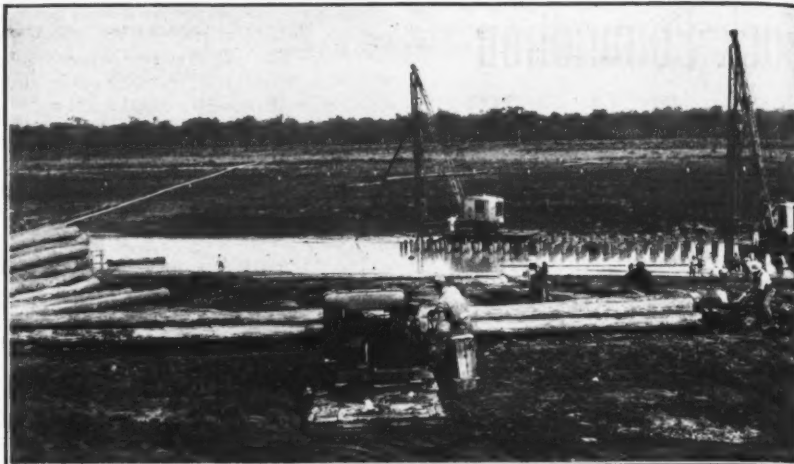
First a channel was dug across the batture from the river to the levee by the Government-owned B-13, a Bucyrus-Erie steam dragline with a 165-foot boom and a 6-yard bucket, mounted on a barge. This channel was dug at an

upstream angle, diagonally across the ground, for a length of 1,300 feet, at a time when the river stood at a 13-foot stage. Coming in at that angle meant that the water in the channel stayed calm, and wave wash against the side of the levee was eliminated, even though the mighty river was rushing past just a short distance across the batture.

When the levee was reached, the B-13 dug a chamber large enough to accommodate also the dredge Grisley which was towed through the channel. Then with the dredge inside the chamber, the B-13 closed the channel entrance, landlocking the craft. In the meantime two 1½-yard draglines on crawler treads were digging a flotation channel from the job site up to the land side of the levee. This channel was 1,578 feet long x 30 feet wide x 7 feet deep, with 2 to 1 side slopes.

Through the Levee

The channel was not opened up as far as the road that winds along the



C. & E. M. Photo

A skidder rig moves piles down into the foundation cut for Algiers Lock. The rig consists of a Dake 2-drum hoist driven by a Red Seal gas engine, and 1,200 feet of ½-inch cable running to a sheave on a deadman on the opposite slope of the cut.

land-side toe of the levee. A good-size plug of earth was left intact along the side of the road over which a detour

(Continued on next page)



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(Also see page 49)



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was constructed. Then the crawler-type draglines dug a chamber between the regular road and the detour. The excavated material was cast up to form a dike ring tying back to the main river levee. Traffic along the river road then used the detour over the earth plug. The main river levee was next cut down to plus 5.0 elevation, which was also the elevation of the road surface. Water from the chamber on the river side of the levee poured into the chamber on the land side of the big earth embankment.

Admitting water to both chambers was no haphazard operation. The amount necessary to provide 5 feet of flotation over the river road had been carefully calculated, and these figures had entered into the constructed size of both chambers. The stage of the river when the job was undertaken was also taken into account. With such precise engineering work, neither the base of the levee nor the base of the road was disturbed. The dredge was floated through the levee, passing from the outside to the inside chamber in which the water level had been equalized.

Once the dredge was through the levee, the water was lowered in the chambers to an elevation of approximately plus 4 feet Mean Low Gulf by means of ducts under the back ring dike and detour road. The ring levees across the road at the toe of the levee were de-graded and this section of road was opened to traffic. The draglines closed the gap that had been made in the levee. Then the plug carrying the detour road was opened, connecting the flotation canal with the chamber containing the dredge. The two bodies of water equalized, and the dredge was towed down the canal to the job site.

The transit of the dredge through the levee was made with the minimum amount of excavation, and without touching the base, which is the most important part of the structure. By careful calculation of the impounded water, no pumping was required as the dredge was moved from the river to the approach canal, to the first chamber, to the second chamber, and finally to the flotation canal. This operation took place in May, 1947, when the river was normally high.

Excavating the Site

Some preliminary excavation at the site had been done, with four Caterpillar D8 tractors pulling Athey wagons which were loaded by a dragline. This top scraping of material to a depth of about 5 feet was placed in stockpiles to be used later for backfill along the lock wall. Retaining dikes were constructed around the spoil area. Later the dredge pumped the hydraulic material from the cut behind these earth barriers. The solid material was thus retained and prevented from sloughing back into the big hole.

The size of the excavation required for the lock was 1,566 feet long x 550 feet wide, measured between tops of slopes. The flat "ditch" or bottom of the hole was 90 feet 6 inches wide, with flat 10 to 1 slopes at the sides. In the lock chamber the excavation went down to minus 20.5 elevation, while the gate bays were dug slightly deeper, or to elevation minus 24.0. To keep enough water in the large hole so that the dredge could operate, two 6-inch pumps were employed to draw water from the Mississippi; the dredge itself was drawing off considerable water as it excavated with its 10-inch hydraulic pump.

The Grisley was powered by a Fairbanks-Morse 200-hp diesel engine on the main pump, with the hauling gear and other operations driven by a Cummins 225-hp diesel. The discharge line was 2,000 feet long, extending back to the rear of the retaining dikes. War-time life rafts served as pontoons to support the floating portion of the discharge pipe.

Unwatering the Hole

When the excavation of the site was completed in November, 1947, the dredge was moved into the flotation channel; a dam was constructed across the connection; and the dredge pumps were put to work unwatering the big depressed bowl. The upper 10 feet was pumped out as quickly as possible, and then the use of the dredge was discontinued. Two 6-inch gasoline-driven pumps removed the rest of the water. But below the 10-foot level the unwatering was restricted to 12 inches in 24 hours. This gradual removal of the water prevented sloughing along the slopes, and also gave the ground water a chance to drain out of the banks.

During these unwatering operations, the dredge Grisley withdrew to the Mississippi in much the way she had passed through the levee six months before. But this time the river was at a low-water stage of approximately plus 2.0 elevation. The 1½-yard

(Continued on next page)



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New Lock Foundation Built on Timber Piles

(Continued from preceding page)

crawler-type dragline dug the earth locks or chambers necessary to the maneuvers, and the procedure was just about the reverse of what had been done in May. When the entrance had been made, however, the necessary water to fill the chambers had been easily supplied from the river, then at a high stage. During the exit, the river was low, but as the contractor was unwatering the excavated lock site, this surplus water was used to fill the lock chambers through which the dredge was passed. Thus this passage to the river, by reason of careful planning, required no pumping.

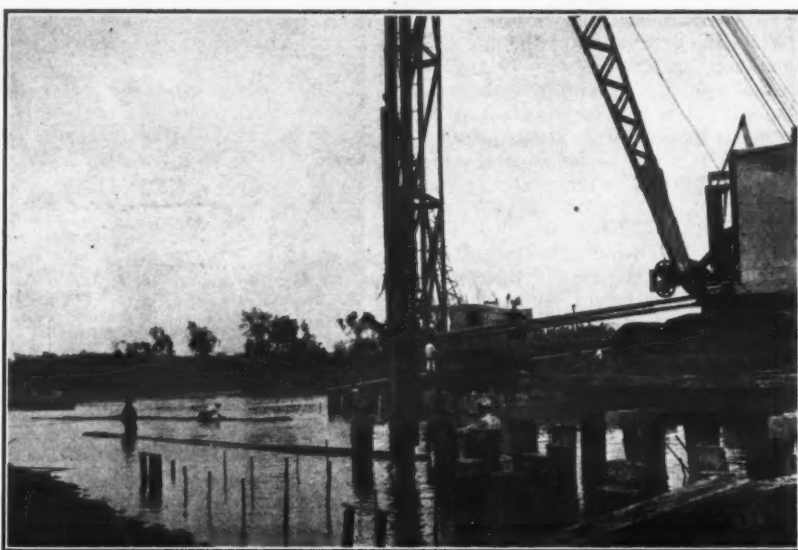
Once the levee was behind the dredge, a channel was cut directly across the batture to the river. With the water low in the Mississippi, the precaution of digging a longer diagonal channel was unnecessary. Two chambers were excavated in the batture to lower the dredge to river level. Three days were required to move the dredge through the levee on the way out—the same amount of time that had been used on the way in. On both occasions heavy rain fell throughout the operations, but despite these adverse conditions, especially to the dragline work, the passages were made without incident. No seepage has appeared where the breached section of the main levee was rebuilt. Thick grass has once again covered the slopes, and it is now impossible to detect where the opening was once made.

Meanwhile, after the lock site had been unwatered, deposits of slush and sludge were left along the bottom at the center of the cut. A skidder rig, using a long timber as a drag, worked back and forth across the hole, pulling the undesirable material to the gate bays at either end. These gate bays, being a few feet deeper than the lock itself, were filled with water. The mixture of muck and water was then pumped out of the hole, leaving the site smooth and clean, ready for the timber foundation piles.

Timber Pile Foundation

Untreated-timber piles, averaging 50 feet long with 8-inch tips and 12-inch butts, were obtained from the pine woods in eastern Louisiana. After being stripped, they were loaded on pole trailers and hauled to the job site. But when wet, the soft, spongy ground around the excavation could barely support a person, much less a heavily laden truck. So a subcontract was given to J. Ray McDermott Co. of Harvey, La., to construct a road 2,000 feet long from the river road along the levee in to the job site. The road consisted of 3 x 10 "ties" placed on 24-inch centers, with three other 3 x 10's nailed lengthwise along the cross members on each side for the wheels to track over.

The timber piles were unloaded at the top of the slope, and snaked along the ground with an Allis-Chalmers



C. & E. M. Photo

About 2 feet of water was left in the excavation for Algiers Lock to keep the clay firm underfoot for the workers. Here the drop hammer strikes a timber foundation pile while men in the water begin to float another pile over to the driver.

tractor pulling. They were moved down the slope to the bottom of the cut with a skidder rig. This consisted of a Dake two-drum hoist powered by a Continental Red Seal gas engine, working with 1,200 feet of $\frac{5}{8}$ -inch cable. The rig was set up on the slope of the cut near the heaped-up timber piles. On the opposite slope, 600 feet away, a sheave was fastened to a deadman buried in the ground, and the endless cable was stretched between the two points. A chain was wrapped around three or four piles and secured to this cable. The skidder then slid the piles down the slope to the bottom of the hole.

Driving the Piles

At the beginning of the job the hole was pumped practically dry, but if the ground was even slightly wet, the men in the hole handling the piles bogged down completely in the soft blue clay. Thus even after a light rain the workers stuck in the oozy clay and were unable to free themselves, much less handle the long timber piles. But it was discovered that if the ground was completely covered with water, the clay acquired a firmness that permitted the pile handlers to walk around readily without getting stuck. Accordingly about 2 feet of water was kept in the bottom of the excavation. Besides af-

fording firmer footing to the men, the water made pile handling easier, since the timber piles could be floated to the driving rigs.

Driving was done by two Koehring crawler-type cranes working from timber platforms built over the tops of the piles as they were driven. Both rigs had 50-foot booms from which were suspended 65-foot swinging steel leads. At the bottom, the leads were connected to the crane by two tubular steel pipes. Moving in the leads were 3,000-pound drop hammers with 1,600-pound header blocks for a combined weight of 4,600 pounds.

The piles were spaced on 4-foot 2-inch centers lengthwise of the structure, and 4-foot 6-inch centers across. They were driven to 20-ton bearing in a stratum of sand and shell to elevation minus 67.5. The average penetration through the lock chamber was 47½ feet, and about 3 feet less in the gate bays. Clay extended from the top of the cut down to elevation minus 55.0 where the harder stratum of sand and shell was encountered.

The two rigs worked lengthwise over the site, one slightly in advance of the other. Across the lock chamber 20 piles were driven, so when a rig drove half of this number, or 10 piles, it advanced a row. Both drivers drove a total of 400 piles during an average week of five 8-hour days. This, of course, was done with favorable weather, and not when the big hole was completely filled with water as it was early in March. An 11-inch rainfall on March 5 caused all the surrounding drainage ditches to overflow, thus flooding the lock site. Pumps unwatered the excavation, and

(Concluded on next page)

SEALTEx is applied on many road construction projects. Here is a typical state highway application.



SEALTEx concrete curing compounds meet the exacting specifications of the Bureau of Reclamation, Army and Navy, other Federal agencies; State Highway Departments, Counties, Cities, Engineers and Architects.

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470 Fourth Ave., New York 16, N.Y.

a 6-inch pump was left in each gate bay to draw off the excess water that seeped in. Piles were driven on the southern half of the job first, and then the northern half. The average cut-off of the driven piles was 3 feet.

Personnel

Byrd & Bruns Bridge Co. employed an average force of 25 men on the pile-driving contract under the direction of Horace G. Byrd, Superintendent and a member of the firm.

For the Corps of Engineers, Department of the Army, Horace L. Dear is Resident Engineer. The project is located in the Pointe-a-la-Hache Field Office subdivision which is supervised by Rupert G. Hodges, Field Assistant. The New Orleans District Office is headed by Col. John R. Hardin, District Engineer.

Equipment-Purchase Financing Service

The financing services of the C.I.T. Corp. and some of its plans for the future were outlined in a recent statement by E. T. Neville, Vice President and National Sales Director of that company. Contrary to rumors that C.I.T. is withdrawing from the field, Mr. Neville emphasized that the company is planning even greater penetration and service to the construction industry.

The financing arrangements available include three types of service—credit through arrangement with the manufacturer of the equipment to be purchased, through arrangement with the dealer, or by direct negotiation with the contractor making the purchase. Last year, it was pointed out, C.I.T. arranged for financing the purchase of about \$60,000,000 worth of equipment—ten times the value of the equipment in the outdoor display at the recent ARBA Road Show.

C.I.T.'s financing service is based on the theory that equipment should be paid for by its earning capacity. In these days, Mr. Neville said, to be successful, a contractor must have modern labor-saving equipment. But he must also conserve his working capital in order to secure contracts, meet his normal current financial obligations promptly, and be ready for any emergencies. The C.I.T. service is set up to make it possible for contractors to pay for their equipment from the earnings of those machines.

Complete details on this financing service may be secured by interested contractors and equipment dealers direct from the C.I.T. Corp., One Park Ave., New York 16, N. Y. Or just use the enclosed Request Card and Circle No. 90.

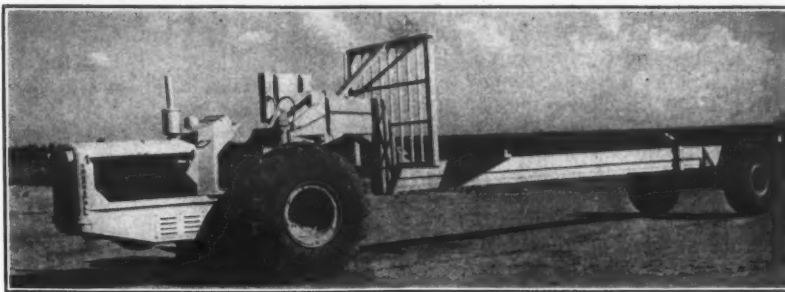
Damp-Proof Compound

An emulsified mastic compound for damp-proofing exterior concrete and masonry surfaces below grade is made by the Building Products Division of L. Sonneborn Sons, Inc., 88 Lexington Ave., New York 16, N. Y. Hydrocide 700 is said to contain a specially refined asphalt reinforced with long-fibered asbestos, held in suspension by mineral emulsifying and asphalt-stabilizing agents.

Hydrocide 700 is applied with a trowel to a thickness of about 1/16 inch. It is then said to form an elastic, membrane-like coating that is resistant to the penetration of moisture from the soil. It can also be used in cold-storage rooms over cork or similar insulation where it functions as a vapor barrier.

According to the manufacturer, about 4 or 5 gallons of Hydrocide 700 are required to cover 100 square feet of surface. It is packed in drums, 1/2 drums, and 1 and 5-gallon containers.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 68.



The TH-4 Tournahauler is designed to navigate the mire, sand, grades, and sharp turns of off-highway travel with its load of steel, pipe, timber, etc. It is also adapted for on-the-road travel. Its maximum capacity is said to be 26,000 pounds.

Long-Member Hauler

A new model of the Tournahauler is announced by the Tournahauler Division of R. G. LeTourneau, Inc., Longview, Texas. The Model TH-4 is described as a 45,000-pound vehicle designed to haul heavy length loads such as steel structural members, pipe, timber poles, etc. It is said to have a capacity of up to 26,000 pounds, and is recommended by

LeTourneau for use in sand and mire, on steep grades, and other off as well as on-the-road travel.

Among the features claimed for the unit are the Tournamatic torque-proportioning differential; electric power steer permitting a full 90-degree turn of the Tournapull in relation to the rig; proper distribution of load on both front and rear wheels; and elimination of exposed springs and other vital assem-

blies under the frame.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 92.

Mobile Service Station

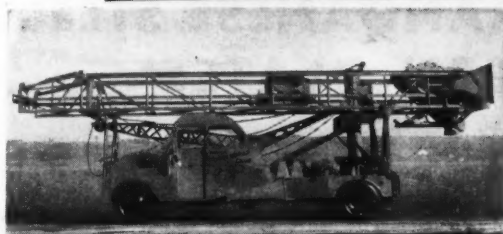
A bulletin about the Kilroy mobile service station has been prepared by Jax, Inc., 7900 Batavia St., Pittsburgh 21, Pa. It describes the Kilroy as a complete one-stop service unit for heavy-construction equipment in the field.

A feature of the bulletin is a large center spread of photographs showing several of the repair and maintenance operations which Kilroy performs—greasing, fueling, tire inflation, tire removal and so forth. The bulletin also describes the equipment which is built into the Kilroy shop, capacities of the various material-storage tanks, and other specifications and features of the machine.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 94.



CRANE BOOM is available in lengths up to 40 feet.



WAGNERMOBILE - CRANE can be folded down for transit and travels at highway speeds. This mobile unit can be used on many jobs over a wide area.

TOWERMOBILE, with tower extensions, pours concrete on high buildings. 95-foot towers have been used. New hydraulic tower raising attachment speeds erection of high towers.

... a Mobile Elevating Tower and Truck Crane

Construction of hoisting towers is costly! An investment NOW in a WAGNER TOWERMOBILE CRANE will provide an easy means of hoisting materials for a good many jobs to come, PLUS a crane boom for all around lifting and materials handling. One man operation... can be driven to the job and set up in ten minutes. 35-ft. tower and one 10-ft. extension is standard equipment, additional 10-ft. tower extensions can be added to suit requirements.

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The new aluminum Saf-T-Swing winch for swinging scaffolds features three separate braking devices for safety.

Winch and Stirrup For Swing Scaffold

A new winch and stirrup for swing scaffolds has been introduced by Safway Steel Products, Inc., 6222 W. State St., Milwaukee 2, Wis. The Saf-T-Swing stage, complete, consists of two winch-and-stirrup units, a guardrail, and a center post. Each winch is equipped with 150 feet of $\frac{1}{4}$ -inch 6 x 19 plow-steel wire rope, and is said to have a capacity of 625 pounds. Safe loading limit for the platform is said to be 25 pounds per square foot. Platforms measuring up to $2\frac{1}{2}$ feet in width and 20 feet in length can be used in the stirrups.

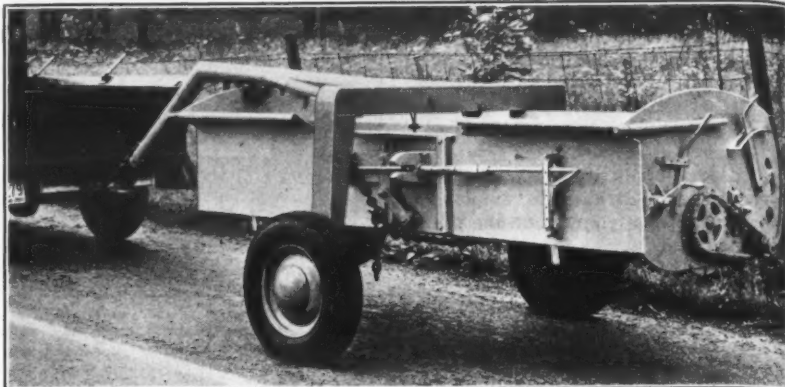
The winch is equipped with a two-way crank and can be raised or lowered at a speed of 20 fpm. Three distinct and separate braking devices are listed among the safety features of the Saf-T-Swing: a Weston-type mechanical brake said to engage automatically when the crank handle is released; a pawl which must be disengaged manually from the drum ratchet in order to lower the winch; and an automatic crank-handle stop which must be released manually before lowering. If four bolts are removed, the winch can be detached from the frame and used as a separate hoisting unit.

The winch drum, frame, crank handle, and stirrup are of all-aluminum construction and have a total weight of 55 pounds. The special guardrail is held by posts bolted to each stirrup, and is further supported by a center post which may be attached to the platform at any location. The winch is equipped with three planetary gears and self-lubricating Oilite bearings. Another feature claimed is that the cable can be pulled from the drum by hand, to reduce rigging time and allow inspection of the cable.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 25.

Spreader-Box Hauler

A 2-wheel trailer frame for use in high-speed transporting of spreader boxes is manufactured by The Highway Special Equipment Co., 2040 Wilson Road, Hilliards, Ohio. The Safe-Easy Transporter holds the spreaders lengthwise of the roads being traversed; this cuts down on the traffic hazard created when they are hauled widthwise.

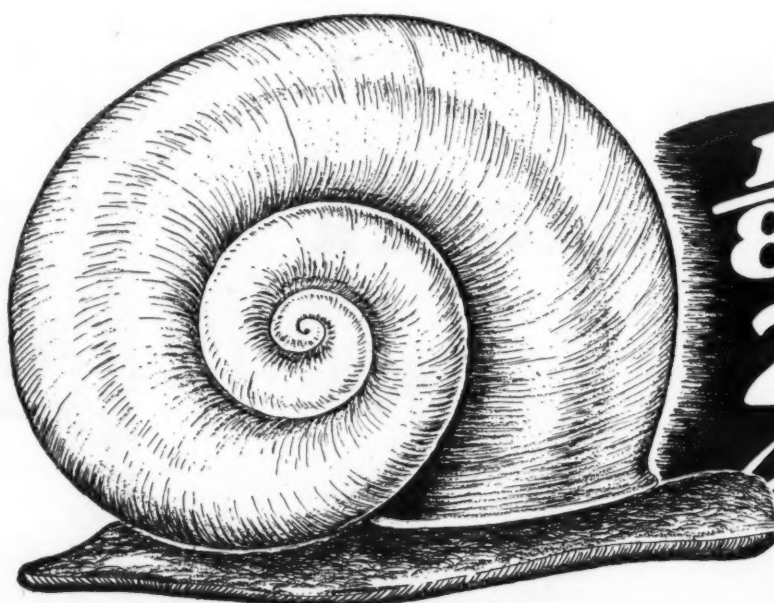


Spreader boxes are carried lengthwise of the road in this Safe-Easy Transporter, to eliminate traffic hazard. One man can hoist the spreader box into position and fasten it to the trailer frame. The unit measures 69 inches from hub to hub.

Another feature claimed for the Safe-Easy Transporter is that it is one-man-operated. To load the spreader, the frame is placed over the spreader box, which is then hoisted up into position on two lifting hooks by a worm-gear crank. The front end of the box is

bolted to the rigid draw bar, and a chain sling further secures the spreader to the Transporter. The unit measures 69 inches from hub to hub.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 13.



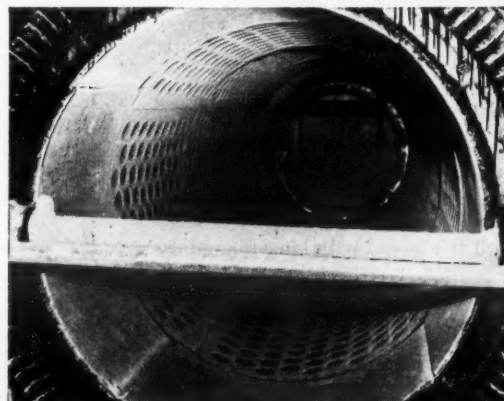
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THAT'S ALL THE WEAR on these AMSCO MANGANESE STEEL SCREEN PLATES

... and it took the tumbling, abrasive battering of more than 7,000,000 tons of tough Illinois limestone to wear away this minor fraction of the original metal thickness. With a $\frac{3}{4}$ " thickness remaining, these Amsco Manganese Steel Plates are still on the job in the revolving screen which handles rough sizing and facilitates distribution throughout the plant of the $3\frac{1}{2}$ " to $4\frac{1}{2}$ " material from the secondary crusher.

This is only a small part of the Amsco manganese steel used at our customer's plant. In the production of limestone for railroad ballast and other purposes, Amsco manganese steel slows wear on crusher jaws, mantles, bowl liners, and other parts to a snail's pace.

Ductile to resist impacts; polishing and work-hardening to resist abrasion... "the toughest steel known" fights the battle against wear on every front. Take a big slice out of costs and delays caused by equipment repair and maintenance—specify AMSCO MANGANESE STEEL CASTINGS for abusive service.



AMERICAN

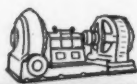
Brake Shoe

COMPANY

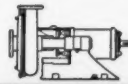
AMERICAN MANGANESE STEEL DIVISION

CHICAGO HEIGHTS, ILL.

Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo.
Offices in principal cities. In Canada: Joliette Steel Limited, Joliette, Que.



MANGANESE STEEL CASTINGS
"CHROME-MOLY" STEEL CASTINGS
HARDFACING ELECTRODES
GRINDING MILL PARTS



DIPPERS DREDGE PUMPS CRUSHER PARTS

CHAINS

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BUCKETS

WHEELS

BREAK-PAVEMENT

the low cost way!

By Using

THE MIGHTY MIDGET

Also tamps trench backfill. Puts back all dirt excavated, filling only once; tamps to sub-grade level, obtaining high, uniform compaction, leaving job ready for immediate pavement. (MM-5)



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Asphalt-Paving Job Includes Underseal

Traffic-Battered Concrete Road Asphalt-Undersealed; Widened, Resurfaced With Hot-Mix for 17.3 Miles

By E. O. BEATIE, Engineer

ONE of the biggest asphalt-paving projects in the history of the Texas State Highway Department was carried out on U. S. 90, just east of Beaumont, during the summer and autumn of 1947. Two separate sections of worn portland-cement concrete, totaling 17.3 miles, were undersealed with a 30-penetration asphalt. Then they were widened and resurfaced with four different types of hot-mix asphaltic concrete.

Approximately 468,600 gallons of 30-penetration asphalt was used in the undersealing process. And about 120,000 tons of hot-mix, involving 5,614 tons of 90-penetration asphalt, was placed in the widening and resurfacing operations. The low bid for this project amounted to \$996,524, and the contract was awarded to Reynolds & Williams of Tyler, Texas. The contractor sublet the undersealing operation to Wallace & Bowden of Dallas, Texas, and the widening and resurfacing of the east section to The Noonan Construction Co. of Beaumont, Texas.

The east 20-foot-wide section of concrete pavement on this project extended from 4th Street in Beaumont westward to Amelia, or for a distance of about 4.5 miles. The west 18-foot section extended from the Liberty-Jefferson County line westward towards a point near Raywood, or for a distance of about 12.8 miles. These sections, located over very bad soil types including muck, carry a tremendous amount of high-speed passenger and motor freight traffic.

Traffic Conditions

The traffic counts for 1941 and 1947 in average vehicles per day on these two sections were as follows:

Location	Average Number Vehicles Per Day	
	1941	1947
East section:		
City limits of Beaumont	7,800	11,530
Amelia	4,400	5,000
West section:		
Liberty-Jefferson County line	3,000	3,300
Raywood	3,700	3,000

U. S. 90 connects the two industrial areas of Beaumont and Houston. About 25 per cent of each of the above traffic counts represents heavy motor freight transporting such items as oil-field drilling equipment, lumber, petroleum products, pipe, and construction materials.

These sections became badly broken as a result of the heavy traffic and the bad subgrade conditions. After initial cracks occurred in the original pavement, the broken condition became progressively worse under the impact of the fast-moving traffic. Resurfacing became highly expedient to reduce the impact loads.

Design Considerations

Undersealing with asphalt, widening, and resurfacing with hot-mix asphaltic concrete was considered by the Texas Highway Department along with two alternate solutions to the problem: (1) construction of a detour, then widening and resurfacing the original slab with cement concrete; (2) widening and covering the existing pavement with flexible base, and resurfacing with a hot-mix course.

The latter two solutions were ruled out, because too great a distance of pavement would have to be blocked off for the operation of equipment, and continuous flow of traffic would be pre-

vented. Another objection was the possibility that rain would waterlog the widening cuts before they could be filled with cement concrete.

Because U. S. 90 is the only route between Houston and Beaumont, it was of primary importance to maintain a continuous flow of traffic through use of a widening and resurfacing material which would be placed and given to traffic in a day's operation. Therefore, the design utilizing undersealing and widening and resurfacing with hot-mix asphaltic concrete was selected.

Undersealing

In the undersealing operations, 30-penetration Texaco asphalt was pumped from a distributor into 1½-inch holes previously drilled through the cement

concrete, and located as directed by the Engineer, until voids in the subgrade were filled and any free water and mud were displaced by the asphalt. Specified temperature limits for ap-

plication of the underseal were 350 to 500 degrees F. Specified pressure limits for the operation were 15 to 45 pounds.

The object of the undersealing operation was to prevent water from penetrating the concrete and to provide a waterproofing layer.

(Continued on next page)



On the east section of the Reynolds & Williams job, the 20-foot slab was widened 8 feet on each side. A Barber-Greene spreader (above) placed the hot-mix in 3 layers. On the west section, the 18-foot slab was widened 3 feet on each side. An Apsco spreader (right) placed the 3 courses.

Gulf Products

keep equipment rolling...

help prevent delays
on flood control project!



John F. Casey Co., Pittsburgh, Pa., has the contract for this important flood control project at Elkins, W. Va. Two earth dams and a connecting canal are being built to divert from Elkins the flood waters of the Tygart River, the course of which takes the form of a hairpin in the city. Pictured here, in the finishing stage, is the diversion dam, upstream from Elkins. Of earth construction, it is compacted and slope faced with crushed rock.

"All-weather protection with Gulf quality lubricants and smooth power with Gulf fuels are playing a big part in our fast progress on this earth dam job," says H. G. Cranston of John F. Casey Co. "In spite of the widely varying operating conditions we have encountered, our equipment has made an outstanding efficiency record."

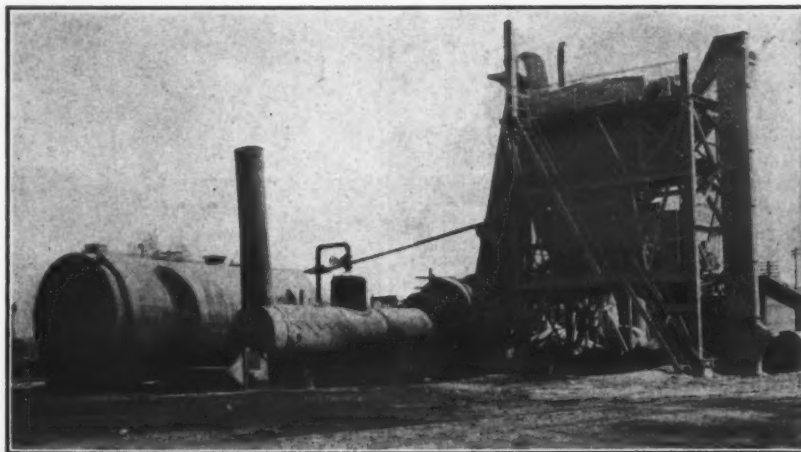
The rate of progress and the profit on any engineering or construction job depend to a large extent on equipment performance. That is why many leading contractors specify Gulf lubricants and fuels — they know that with these quality Gulf products they can always rely on extra hours of trouble-free service from every unit.



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Noonan Construction Co. subcontracted the job of widening and resurfacing the east section of U. S. 90 between Beaumont and Amelia in Texas. At left is the 4,000-pound-capacity Cedarapids weigh-batch-type pugmill the contractor used. Above, an Adnun spreader places Type C hot-mix, and a Huber roller compacts a leveling layer of Type E.

Asphalt-Paving Job Includes Underseal

(Continued from preceding page)

tion was not to bring the concrete pavement to any definite grade, but rather to fill the voids in the subgrade, to minimize further pumping action of the slab, and to underseal the slab against surface water.

It was estimated that about 25,000 gallons of asphalt per mile would be required in the undersealing process. Actually, there was as much as 43,000 gallons per mile in various sections. A total of 468,602 gallons of 30-penetration asphalt was used in the 17.3 miles.

Widening

Both sections of the concrete pavement were widened with hot-mix asphaltic concrete conforming to the Texas Highway Department's special item Type A. The asphalt content, of 90-penetration asphalt, was 4.0 per cent (total-mix basis). Aggregate consisted of crushed gravel and field sand—100 per cent passing the 2 1/4-inch screen. On the east section, the 20-foot slab was widened 8 feet at the surface on each side, and the total thickness of the widening was 10 inches. On the west section, the 18-foot slab was widened 3 feet at the surface on each side, and the total thickness was 12 inches. Throughout the entire length of the job there were numerous places where small pieces of concrete pavement were removed and were replaced with the Type A hot-mix.

The 8-foot widening strips were placed in three layers by a Barber-Greene spreader, and rolling between layers was done by a 10-ton tandem roller. The 3-foot widening strips were placed by an Apsco spreader, and rolling between layers was accomplished by a Bros rubber-tire Wobble Wheel roller, followed by a 10-ton tandem.

About 34,251 tons of hot-mix was placed in the widening of the west section and about 22,975 tons in widening the east section.

Resurfacing

Both widened sections were then resurfaced with three types of hot-mix, each employing 90-penetration Texaco asphalt and conforming to a Texas Highway Department special item for hot-mixes. Aggregates employed consisted of various combinations of crushed gravel, crushed limestone, field sand, and river sand. The types of hot-mix used are listed as follows in the order in which each was placed:

EAST SECTION				
Type	Thickness in Inches	Tonnage	Asphalt Content Per Cent	Top Aggregate Size Screen
E—sheet used for leveling	2.0	6,660	7.5	minus 3/4-inch
C—coarse-graded surface course	1.5	8,016	4.8	minus 1-inch
F—non-skid surface course	0.6	3,560	4.5	minus 1/2-inch
Total (over slab)	4.1	18,236		
WEST SECTION				
Type	Thickness in Inches	Tonnage	Asphalt Content Per Cent	
E	1.25	13,000	7.5	
C	3.00	26,000	5.0	
F	0.60	5,652	4.5	
Total (over slab)	4.85	44,652		

The sheet asphalt was placed first as a level-up course over the broken concrete pavement, because the small top-size aggregate was more easily spread to conform with the irregular slab surface and to penetrate the cracks. Some of the mix was spread first by blade

before the mechanical spreader was used.

All types for the east section were mixed by The Noonan Construction Co. in a 4,000-pound-capacity Cedarapids weigh-batch-type pugmill. Types E, C, and F were placed by an Adnun spread-

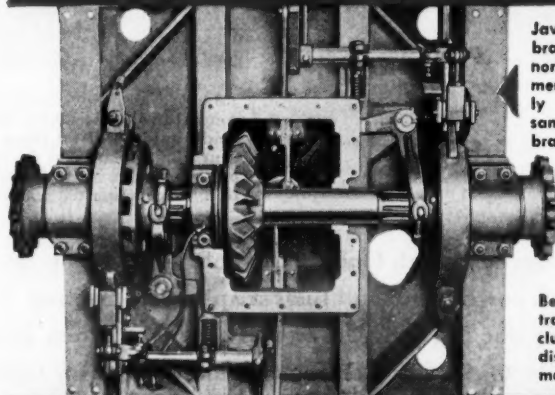
er in three 12-foot lanes, and they were rolled by a 10-ton tandem and a 10-ton 3-wheel roller.

All types for the west section were mixed by Reynolds & Williams in a Barber-Greene continuous-mix plant (Concluded on next page)

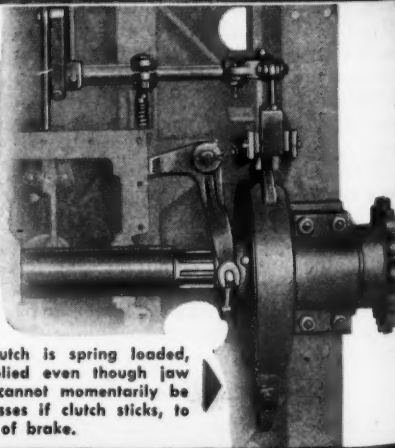
KOEHRING 205

HALF YARD

Works Safely on 30% Grade without Blocking



Jaw clutches and traction brakes work as a team. In normal operation, engagement of brake automatically disengages clutch for same crawler. Applying both brakes locks 205 securely for all operations.

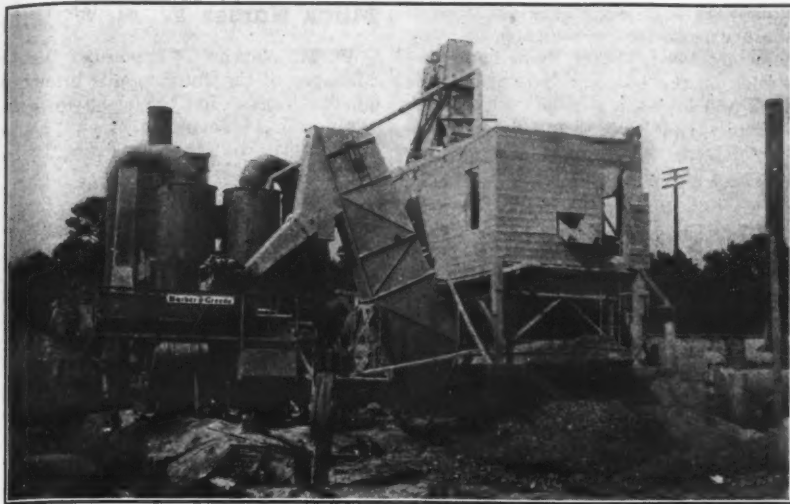


Because linkage to jaw clutch is spring loaded, traction brake can be applied even though jaw clutch is locked tight and cannot momentarily be disengaged. Spring compresses if clutch sticks, to make possible engagement of brake.

HERE'S ANOTHER KOEHRING UNIT THAT WILL SAVE TIME ON YOUR DIRT-MOVING JOBS... HEAVY-DUTY DUMPTOR

6-yard Koehring Dumptor has constant-mesh transmission, eliminates delay for shifting gears... has three fast forward and reverse speeds, can shuttle from shovel to dump, eliminates turning delays... has instantaneous gravity dump, saves 10 to 20 seconds in unloading time every cycle. They're engineered and built to haul tough materials over rough terrain and steep grades... are easy to operate... simple to maintain... will give you less down-time, more work-time. Ask your Koehring distributor for complete Dumptor facts TODAY.





Reynolds & Williams used the Barber-Greene continuous mixer at left to process hot-mix for the west section on U. S. 90. In the second photo, Type F, a non-skid surface course, is placed and rolled. The third photo compares textures of Type F and Type C, a coarse-graded surface course.

utilizing volumetric proportioning. Types E, C, and F were placed by a Barber-Greene spreader in two 12-foot lanes and they were also rolled by the same types of rollers as before.

Field Laboratory Control

The Texas Highway Department's special item for hot-mix asphaltic concrete, mentioned throughout this report, requires 94 to 98 per cent density (opti-

mum equals 96 per cent) in molded specimens and a Hveem Stabilometer stability of 35 per cent minimum. For the weigh-batch plant the following daily tests were made: a minimum of

four combined screen analyses, a minimum of one extraction test, a minimum of one set (of 3) molded specimens for density and stability determinations. For the continuous-mix plant, a minimum of three extraction tests and a minimum of one set (of 3) molded specimens for density and stability were made daily.

Hveem stability tests on specimens of known density were made also in the Highway Department's main laboratory in Austin before construction work began, in order to determine an economical job-mix formula falling within the specification limits.

Rigid control of the mix was exercised in conforming to the pre-established job-mix formula and to the specified temperature limits for the asphalt and the finished mix.

Summary

The completed east section of cement-concrete pavement was widened from 20 feet to 36 feet. The total thickness of hot-mix in the 8-foot widening strips was about 14.1 inches, and over the concrete pavement, about 4.1 inches.

The completed west section of cement-concrete pavement was widened from 18 feet to 24 feet. The total thickness of hot-mix in the 3-foot widening strips was about 16.85 inches, and over the concrete pavement, about 4.85 inches.

This project was constructed without interrupting traffic flow on the only highway between Houston and Beaumont.

Multi-Fuel Engine

A V-8 valve-in-head engine rated at 135 hp is announced by the Le Roi Co., 1706 S. 68th St., Milwaukee 14, Wis. A feature claimed for this engine—and all Le Roi engines—is its ability to run on gasoline, butane, or natural gas, according to which fuel is most readily available.

Among the other features listed for the Model H-540 multi-fuel engine are removable wet-type sleeves; an extra-heavy counterweighted crankshaft; unit construction of crankcase and cylinder block; water-cooled manifolds; full-pressure lubrication; a gear-driven water pump; modern cam-ground aluminum pistons; and push-button electric starting. The engine has a $4\frac{1}{2} \times 4\frac{1}{4}$ -inch bore and stroke, and a displacement of 540 cubic inches.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 97.

Stud-Welding Engineers

Walter E. McArthur has been named Eastern Regional Manager of the Nelson Stud Welding Division of Morton-Gregory Corp. He is succeeded as Field Engineer in the New York territory by Robert H. Simon, who formerly held the same position in the St. Louis area. New York headquarters are located at 220 E. 42nd St., New York City.



No blocking necessary when you're digging in on basement excavations. Safe traction brakes hold Koehring 205 Half-Yard securely.

Saves Time on Every Job

You can work safely on a 30% grade without blocking crawlers on the Koehring 205 Half-Yard. Crawlers are held by big friction brakes, not by a pawl or jaw lock. These friction brakes provide the flexibility that's necessary to cushion brake assembly against operating shocks. That's why there's no danger of brake damage on the 205. Without blocking you will save time on any job.

Here are other advantages of the Koehring 205 Half-Yard brake and steering system:

Traction brakes can be applied at any time, on any grade. Safety spring in operating linkage lets you apply traction brakes even when traction jaw clutches are locked and cannot be disengaged. Your 205 will never run away from you on the grade.

By applying power to one crawler, and brake to the other, you can turn in a tight circle, within 205's own length.

- Easy to make wide turns under accurate control.
- Operator never leaves cab to apply traction brakes or to steer. Separate levers in cab control friction brake as well as jaw clutch for independent operation on each crawler.
- Full steering and brake control is available with cab in any position.

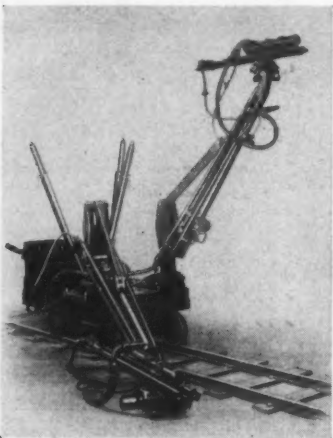
Your Koehring distributor can show you many other ways this versatile Half-Yard can save time, money and increase production on your excavating jobs. Ask him, too, for facts and figures on the larger Koehring 304 and 605 excavators.



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Air-powered booms which can be raised or lowered by touching a lever mark the new I-R drill jumbo. It can work in openings up to 9 feet and 5 to 19 feet wide.

Drilling Jumbo Has Air-Powered Booms

A new drill jumbo with air-powered booms which can be raised or lowered at the touch of a lever is announced by Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. The Boom Jumbo is designed for high-speed driving of drifts, crosscuts, and tunnels, and can work in an opening 9 feet high and 5 to 14 feet wide.

Because of their braced truss construction, the lightweight booms are strong and rigid, I-R explains. The seamless-steel tubing of which they are made also carries air and water to the drills. All controls are on the front end of the booms, convenient to the operator. The air motors which raise or lower the booms are said to insure a positive screw drive. The booms are locked into position to keep them from creeping or settling during drill operations.

Three screw-driven adjustable-length ceiling jacks mounted on the car of the jumbo hold it in place during drilling. When the jumbo is to be moved, they fold back on supports—as do the booms, too. The jumbo car, of heavy-gage steel and welded construction, has toolboxes front and back, plus storage space for detachable bits. Drill steel is carried in the hollow portion of the frame above the wheels. Drills used on the Boom Jumbo have long feeds for handling long drill steel.

Further information may be secured

from the company, or by using the enclosed Request Card. Circle No. 66.

Production Started On Five Power Plants

Five new power plants have been put into production by the Ford Motor Co. of Dearborn, Mich. They are specially engineered for use with cranes, shovels, pavers, pumps, winches, hoists, mixers, and other construction equipment. The new line includes the 337 and 239 V-8 engines; a 254 and a 226 6-cylinder engine; and a 120 4-cylinder engine. The numerical designation in each case indicates the cubic inches of piston displacement.

The 337 V-8 has a $3\frac{1}{2} \times 4\frac{3}{8}$ -inch bore and stroke, and a compression ratio of 6.5:1. It develops 258 foot-pounds of torque. The 254 6-cylinder engine has a 3.5×4.4 -inch bore and stroke, a compression ratio of 6.7:1, and a torque of 211 foot-pounds. The 239 V-8 has a $3\frac{3}{16} \times 3\frac{3}{4}$ -inch bore and stroke, and a compression ratio of 6.8:1; it develops 187 foot-pounds of torque. The bore and stroke of the 226 6-cylinder engine are 3.3×4.4 , the compression ratio is 6.7:1, and maximum torque is 183 foot-pounds. The 120 4-cylinder engine has a $3\frac{3}{16} \times 3\frac{3}{4}$ -inch bore and stroke, a compression ratio of 6.5:1, and a maximum torque of 84 foot-pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 84.

Bridge and Highway Steel

A catalog called "Steel for Highways" is being distributed by the Bethlehem Steel Co. of Bethlehem, Pa. The company's line includes steel for use on right-of-ways, highway bridges and bridge foundations, paving, and highway guards and posts. Among the items listed in Catalog No. 191 are wire rope, hollow and solid drill steel, corrugated roofing and siding for temporary sheds and offices, culvert sheets, steel pipe, nails and form wire, steel reinforcing, Battledock floors, bridge cables, suspension cables, H-piling, steel sheet piling, road joints, welded-fabric reinforcing and hinged bar mats, center strips, guardrails and fittings, etc.

Catalog No. 191 gives only a brief description of each of these, as complete details are available in individual bulletins which are mentioned. But it

illustrates and shows the features of these various items; indicates the way they are used; shows them being installed on the job; and lists briefly the sizes and styles available.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 39.

Mack Names W. M. Watkins

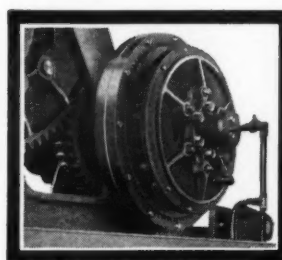
W. M. Watkins is appointed District Manager of the Indianapolis branch of Mack Trucks, Inc. He was formerly Wholesale Manager of Mack's Dallas branch. The Indianapolis branch is located at 421 Kentucky Ave.

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Roadsides Surveyed For Memorial Route

Roadside conditions were recently surveyed along 50 miles of U. S. 22 in New Jersey. This was necessary because the State Legislature last year designated the entire length of the route in New Jersey as part of a memorial highway to men and women who served in World War II—the Blue Star Memorial Highway System. How far the route had been commercialized and what could be done about it had to be determined. So The Institute of Local and State Government of the University of Pennsylvania was requested by New Jersey Commissioner Spencer Miller, Jr., to do the fact-finding.

The Institute's chief recommendation based on its survey was that effective local zoning ordinances be enacted to provide adequate roadside control (state roadside zoning is not possible in New Jersey under existing laws). And it urged that municipal zoning be stimulated through the Route 28-29 (U. S. 22) Association, which should include representatives from each municipality along the route.

The report revealed that 52 per cent of the municipalities along the highway have zoning ordinances, but that only 46 per cent of the mileage involved was included in the zoned area. By mapping land uses in the zoned portions, the Institute found that sections zoned for business plus unzoned sections made 71 per cent of the total mileage available for business use. Another map breakdown of the existing business uses resulted in this conclusion: "If the above uses were evenly spaced along the highway, gasoline could be obtained every 0.4 mile, and a meal or sandwich every 0.6 mile... a motorist traveling at a 45-mile-an-hour speed would see a gasoline pump every 32 seconds and a restaurant or lunch stand every 48 seconds."

A third series of maps suggested a plan of zoning for the entire length—a realistic plan in which there was no attempt to recommend residential zoning where existing business uses made that improbable. In fact, the suggested mileage to be zoned for business and industry was actually increased by 1.2 miles, although almost all of the unzoned area was recommended for residence-farm zoning. Nor did the report frown on the placing of industries along the route. It called attention to existing examples of light industry in parklike settings throughout the state that would be assets rather than detriments to the contemplated memorial highway.

In conclusion the report suggested certain provisions which should be included in existing and new zoning ordinances: (1) setback provisions of a minimum 25 feet measured from the side line of the highway; (2) off-street parking facilities for uses that invite parking; (3) limitation of signs on sites where businesses are located; (4) prohibition of billboards; (5) elimination of nonconforming signs and billboards after the period of amortization; (6) regulation of tourist cabins and automobile courts to insure proper location, attractive appearance, and

protection of health and safety and morals.

Diesel-Motor-Grader Data

An 8-page catalog intended to show contractors the extreme versatility of diesel-powered motor graders is being distributed by the Caterpillar Tractor Co. of Peoria 8, Ill. This catalog, No. 11316, shows the graders at work on backsloping, ditching, final finishing, light clearing operations, and oil mixing.

The bulletin shows pictures of the graders in use on a wide variety of jobs, and lists some of the major features and specifications of the Caterpillar line.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 91.

Poley-Abrams Relocates

The engineering and contracting firm of Poley-Abrams Corp. has announced the removal of its offices to 2 Elm Place, Brookline Village, Mass.

Here's the Way to Keep Tools Sharp and Clean!

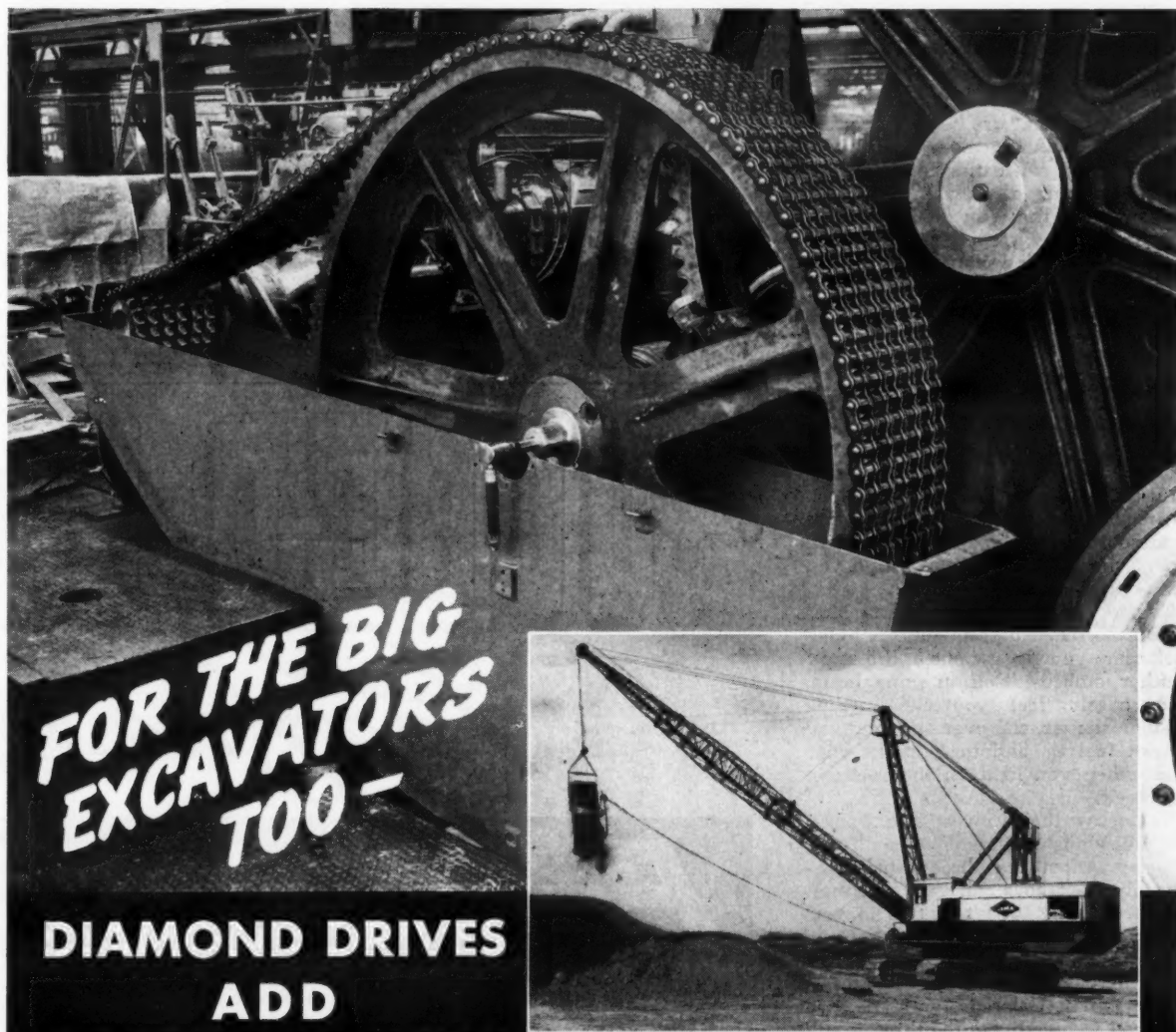
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**ROLLER
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Safety Engineering: A Practical Viewpoint

**A Safety Engineer Says
Accident Prevention Is
Common Sense and Hard
Work in Practical Use**

By **RAYMOND P. DAY**,
Western Editor

★ **HERE** is how it feels to die.

You check your jackhammer at the start of the shift. Charley, the drill foreman, is half drunk, but you don't pay too much attention because you've smelled it on him before. Only a couple of days ago you had words with Charley and refused to re-drill a misfire he caused by rum-dumping around.

Charley says, "Your gang better drill the big one on the wasteway there. Take George and Tom with you. I sent Frank up to clean it off."

You set up and start working. When Charley doesn't come around you get a sense of foreboding. But you figure his bottle is around the compressor and that's the reason he's staying there. Rum-dum or not, surely he'd have said something if there were any powder and caps misfired in this rock.

You check more carefully. You don't see any old holes. You don't feel drill steel hitting any pockets. The machine is zinging away fine. You open the blow valve, and you don't see anything suspicious coming up out of the hole. Nothing but rock dust.

"Hell, I must be getting jittery!" you think.

You settle down to some steady drilling, throwing your leg over the jackhammer to steady the machine. And then it happens like lightning. You hear a little hiss, like air escaping. You look down, terrified. But before you can even see the crumbled powder coming out of the hole, the earth around you tears open with a roar.

The jackhammer leaps up and jams its handle through your guts. A flying rock tears your leg off above the knee; another embeds itself in your brain. You barely feel yourself hurtling through the air, end over end, and you do not feel the fall that breaks your back when you light on the rocks in the creek.

Tomorrow they'll investigate. They'll ask questions. Eventually they'll fire Charley, when the three other desperately hurt boys can gasp out their stories. But it doesn't matter to you, because you are dead.

Brutal? Certainly. But this actually happened not many weeks ago on a heavy job in Colorado, and the man who had to investigate the thing is still sick with the horror of it. He has seen too much of this sacrifice of human beings on the altar called "expediency" to be anything but horrified. To him, these accidents are something medieval from the torture chambers of the Spanish Inquisition. To him, they mean blood and horror and suffering and the lack of common sense. The last thing they represent is a position on a graph, or a job for somebody.

But ironically enough, it is his job to stop them.

This he can try to do. How he has gone about it is a story of perseverance, of tact and humaneness.

His name is Phil Denton. He is Safety Engineer for the United States Bureau of Reclamation on the Colorado-Big Thompson Project. As the chain of command goes, he is below the Regional Safety Engineer at Denver, A. T. Cromwell, but his is the day-to-day contact with the things that may cause men to die.

Phil Denton is a mild-mannered man, an extrovert, a native-born son of

Colorado. Crippled by arthritis, he drives himself to see that nobody else gets crippled—to the concern of his friends on both sides of the construction fence, engineers and contractors alike.

He is the last man to pretend that accidents do not happen. He admits that they do, and he has some explanations for their causes. In his daily work he rides herd on about 15 heavy-construction contracts running from \$45,000,000 to \$100,000,000 and employing about 9,000 men. And every job is a potential man killer.

How Do Men Die?

How do men die? Explosives seem to be the number one killer on the Colorado-Big Thompson Project, which is all very heavy construction work in the Rocky Mountains: dams, tunnels, penstocks, conduits, siphons, dikes, roads, canals, surge tanks, powerhouses, and power transmission lines.

Some construction stiffs complain that powder isn't as good as it used to be. Neither are the men who handle the stuff, Denton believes.

Tunneling work occupies the number two spot on the list of killers. Falling rock, powder again, fumes, close quarters, slipperiness, missteps, water and mud, darkness or dingy light—all lurk 24 hours a day to take their toll.

High-voltage power lines take their toll, too. The Bureau's own men, who handle the transmission of power, work



U. S. Bureau of Reclamation Photo

Three men were killed by this rock in a tunnel cave-in—two drillers and a chuck tender. And all because they were rushing, got careless, and extended a heading a little too far past the bracing!

hand in hand with the number three killer. Contractors get killed, too.

Falls, heavy equipment, stumbling.
(Continued on next page)

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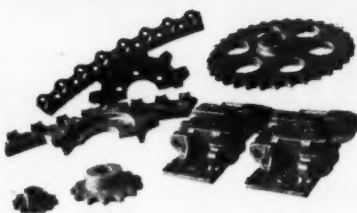
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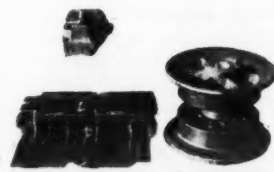
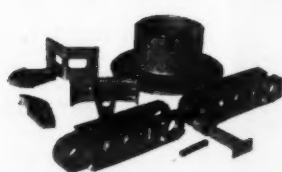
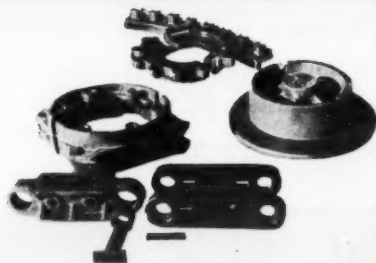
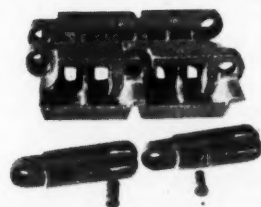
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falling objects, and unguarded machinery are the cripplers.

Over a period of many decades the Bureau has studied all types of accidents and prepared a manual for most types of work. That manual is now nearly 3/4 inch thick. It contains detailed regulations and rules for the safe conduct of dozens of types of Bureau work. And still accidents happen, sometimes from the same old causes; sometimes from apparently new ones. Why?

Carelessness, inexperience, incompetence, ineffective safety programs, and the failure of materials are some of the often-repeated causes. Denton can think of still another reason: *some men want to get hurt.*

To illustrate the point, he tells about a Bureau employee, not engaged on especially hazardous work, who had seven lost-time accidents one right after the other. It got so bad that the Construction Engineer, at Denton's suggestion, transferred this man to work where he couldn't possibly get hurt without trying to do so. The man took several days of annual leave, and while at home broke his arm!

Recent studies in psychosomatic medicine have firmly established the theory that men governed by various subconscious reasons, will get themselves injured. Some may have a conscious desire to get compensation for not working. But some may subconsciously need or want attention, and an accident is one way to get it. Some may want revenge. Some may want to punish themselves out of a feeling of guilt, and that kind of self-punishment winds up on the lost-time statistics.

Illogical? Certainly it's illogical. But too many studies have shown that men are motivated that way. Just recently a factual account of this phenomenon, dramatized on a National Broadcasting Co. radio program, was enough to make a safety engineer's hair turn white.

Denton believes that only a wiser kind of foreman can reduce accidents from this cause: a man who can size up the individuals in his crew; a man who can draw other men out and learn their secrets. As for entirely eliminating this type of accident, there is no way until we live in a happier world.

It can readily be seen that this kind of accident prevention requires (1) an extrovert who likes people, and (2) a man who is liked and admired by his associates. Denton has been able to reduce accidents because he has reduced the personal tensions of many of the workers through safety meetings, through casual visits, or by friendly greetings.

A foreman with a nagging, shrewish wife longs for a friendly chat with someone he likes. Denton meets him on a job, pauses a few minutes to engage the fellow in a conversation about fishing. He makes a friend, eliminates a potential accident.

A truck driver, galled by the thought of a policeman's ticket that morning, gets a few kind words of explanation from Denton as to why it isn't necessary to speed on the job he's doing. The truck driver doesn't know he's been chided, but the seeds of accident prevention have been sown.

A Reclamation man, Denton knows and abides by the chain of command. When he talks to contractors or their men, he does it as a man and as a friend. In case of non-cooperation, he uses the official chain of command to save lives.

Old Causes Are Worst

It should not be inferred here that Denton is so wrapped up in modern theories of accident prevention that he doesn't believe in the old-time causes of accidents. He does believe in them, and at least 90 per cent of his time is spent dealing with these old, time-proved, routine accident breeders.

The neglect of prevention makes these old causes repeat themselves, in



C. & E. M. Photo
Phil Denton, U. S. Bureau of Reclamation Safety Engineer for the Colorado-Big Thompson project, stands beside a warning sign posted on the job.

one form or another. It is incredible that the same men, the same contractor, and the same type of job always seem

to have to start all over from scratch, repeating the same costly mistakes, each time the contract job changes.

In a typical week's work, then, Denton may be called upon to do all the following things:

1. He may have to investigate a fatality, with a 3-man board appointed by the project Construction Engineer, and write a comprehensive report of the accident.

2. He investigates all accidents to Bureau of Reclamation cars, and, since accident forms have to be made out for dented fenders and the like, this takes time.

3. He makes personal inspections of the various jobs, checks the hazards actually seen, and takes their correction up with the contractor, the construc-

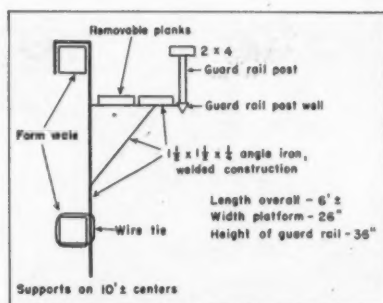


Diagram of the movable angle-iron frames for holding scaffolding, designed for the Colorado-Big Thompson job.

tion inspectors, and the resident engineer.

4. He goes over all construction in-
(Continued on next page)

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b. Straight Cutting Edge	5		
3. a. Low Center of Gravity	10	10	
b. High Center of Gravity	5		
4. a. Open Top Bowl	10	10	
b. Obstructed Bowl Top	5		
5. a. Weight Distribution 45% front 55% rear	10	10	
b. Weight Distribution Otherwise	5		
6. a. Under 5% variation	10	10	
b. 5% to 15% variation	5		
c. Over 15% variation	2		
7. a. Interchangeable Tires—Front & Rear	10	10	
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8. a. Positive Forced Ejection	10	10	
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Safety Engineering: A Practical Viewpoint

(Continued from preceding page)

spector's daily reports, since construction inspectors of the Bureau are all supposed to be safety-conscious on their jobs.

5. He may give preliminary safety instructions and a safety manual to a new contractor who is moving in to do a job.

6. He may conduct a safety meeting, in company with contractors and USBR men.

7. He will complete all the lost-time accident reports made that week by all the contractors.

Field Safety Methods

Such a week is well filled. Still, Denton has noticed that his safety work is always more effective in direct proportion to the time he spends in the field. Last year another Bureau inspector on the Riverton, Wyo., project reported the same observation.

For this reason, Denton tries to spend as much of his time as possible on field inspections. Safety is a slow process, sometimes discouraging to those who work at it, but there is a steady improvement in the construction-industry pattern, Denton believes.

Contract jobs on the Colorado-Big Thompson project are proof of that, with few exceptions. On the power-houses and concrete gravity sections of dams now under way, one sees well guarded catwalks for the safety of carpenters. One carpenter superintendent—Superintendent Harry Hoover of the Peter Kiewit organization—designed movable angle-iron frames, which, when placed on 6-foot centers along a form, easily hold the scaffolding. The frames are welded from 1-inch angle iron in the shape as shown in the sketch on page 29. When they are set along the wall forms, it is then easy to set the guardrail posts in the wells, lay scaffold boards across the frames, and go on about the job.

Another general rule which now is much better enforced is the business of pulling nails out of lumber. Now, when lumber is stripped, the nails are pulled immediately. Even on scrap material headed for the trash pile, the nails are bent over.

More and more attention is being given to safety rules where explosives are used. Manufacturers' recommendations are being enforced now more than ever, but there are still some occasional slips.

Only a few weeks ago, a field inspection of a tunnel job disclosed some treacherous rock. It disclosed other things, too. It disclosed insufficient tunnel bracing. Some loose powder lay on the tunnel floor near the rock face. Two sticks of dynamite with the exploders installed were hung up on the air line!

Denton got busy on that, but it was necessary to bring the resident and construction engineers into the picture. Meanwhile, the contractor, dissatisfied with the progress of the crews, fired two whole crews outright and put the operations on a one-shift basis. Tunnel work was not too plentiful in the west at that time, and the men were more than concerned about staying on. So



the shift that stayed tried to show the contractor some progress.

They got careless. They extended a

(Concluded on next page)

Accident-prevention measures show up wherever you go on the Colorado-Big Thompson Project. The workman in the first picture, unaware that he is being photographed, is pulling nails out of lumber. The middle picture shows a well guarded stairway on a batch plant. Carpenters in the third photo use a sturdy ladder as they work on a pier nose form.

C. & E. M. Photos

Lightweight WITH A HEAVYWEIGHT PUNCH

For a hammer of its weight, the new Barco delivers a mighty powerful wallop. Compact, self-contained, it is carefully built to do dozens of different hammer jobs, even the most severe. More speed, too, has been built into Barco. The new carburetor valve is easier to operate, and the entire hammer is easier to handle because of a new method of holding the cable which also cuts down wear and tear on the cable where it leaves the handle.

BREAKING • DRILLING • DRIVING
TAMPING • FROST BREAKING

BARCO

PORTABLE GASOLINE
HAMMERS

★
FREE ENTERPRISE—
THE CORNERSTONE OF
AMERICAN PROSPERITY
★



Write to BARCO MANUFACTURING COMPANY, 1818 WINNEMAC AVENUE, CHICAGO 40, ILLINOIS
IN CANADA: THE HOLDEN CO., LTD., MONTREAL, CANADA

heading a little too far past the bracing. In a fraction of a second a wall of rock fell in, crushing two drillers and a chuck tender to death in the cave-in. One chuck tender near-by escaped. But this was one of the worst accidents Denton has ever seen.

Accidents under electric power lines are fatal, most of the time. To whip this cause for good, the Bureau has ordered special crosspoles erected wherever roads pass under these high-tension lines. Two poles are set at each approach, and a timber crosspiece is bolted low enough that any crane or other high piece of machinery must stay 10 feet under the power lines to clear the crosspieces underneath.

Where equipment might go under high-tension lines off the roads, special warning signs are put up. No operator of heavy equipment is permitted to forget the danger overhead.

And still, sometimes, it happens. An operator of a loader recently was working in an area where special permission had been granted to operate near some high-tension lines. The operator apparently forgot. The loader contacted the high-tension line, and electricity leaped down through the truck into the ground.

Hearing the noise, the operator jumped out of the truck cab and landed safely on the ground. Several of his friends, seeing the live electricity leaping into the ground, shouted and waved frantically. The operator didn't see them. He walked around the front end of the truck and placed his hand on the cowl to check the engine.

A surge of electricity shot through his body, holding him paralyzed. Later, they took away his body, hardly more than a piece of charred tinder. Where the electricity had gone into the ground, it had melted the gravel to glass.

It is sickening, senseless, and unnecessary.

Denton hopes to see the day when construction safety rules will be as inflexible as those in industry. Meantime, however, he is making progress. He is checking to see that the manual rules are upheld. And he is spotting a few hazards that the manual does not yet cover. Extensive machinery guards have been installed in all the batching plants, bins have been extended to prevent falling rock, and batch-plant operators have a roof over their heads. Up high in the mountains, where lightning is a constant danger, all batch plants are also grounded against lightning.

Rock cuts are always carefully scaled, and in front of the contractors' offices are safety posters. The Reclamation safety manual is well thumbed with constant use.

What more can a man do?

Well, for one thing, Denton believes he can be friendly, sincere, and earnest. He believes no safety manual can possibly cover all the situations that develop, so it is up to the safety engineer to teach men to be prudent, careful, self-reliant. He believes that a safety engineer, above all other human beings, can do his job with imagination and common sense.

It isn't all a bed of roses. Recently, after the triple fatality, Denton increased the already forceful pressure on the tunnel contractor.

"Denton used to be a nice guy," moaned one of the contractor's men, "but he's getting tough like all the others!"

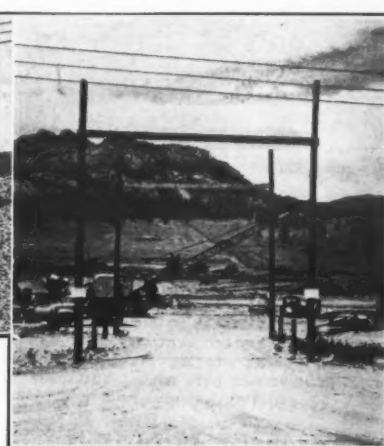
Which is one way of saying they respect him even more.

Soil-Stabilizer Catalog

Soil-stabilization equipment and procedures are covered in a catalog being distributed by the Harnischfeger Corp., 4419 W. National Ave., Milwaukee 14, Wis. It discusses the use of the P&H single-pass soil stabilizer in new construction and reconstruction of high-



C. & E. M. and U. S. Bureau of Reclamation Photos
The operator of this loader (photo above) was killed when his machine contacted the high-tension wires overhead. To whip this cause of accidents for good the Bureau of Reclamation has ordered special poles and crosspieces erected (illustrated in photo at right) whenever roads pass under these lines, in order to maintain a 10-foot clearance for high pieces of equipment.



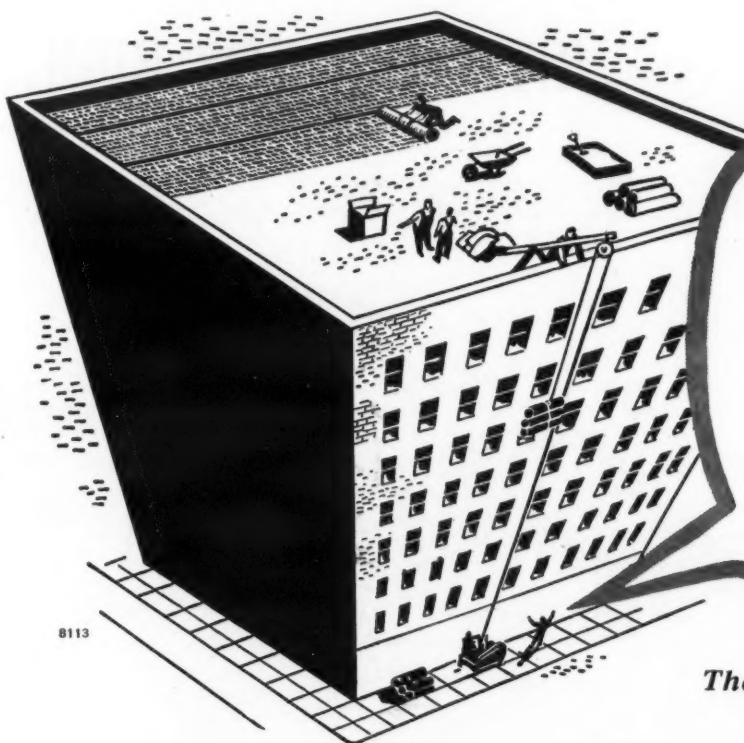
ways, airports, and other traffic surfaces.

It explains that the P&H soil stabilizer meets eight basic requirements for the building of stabilized roads; it shows how the unit handles pulverizing, mixing, and spreading operations; and it

illustrates the one-man control station. It covers each of the five distinct operations which the machine performs. It explains the use of low-pressure hydraulic controls to permit precision operations; it tells how accurate liquid control is maintained; and it describes

the spray nozzles and other features of the machine. Several photographs show the machine in use on a wide variety of soil-stabilizing projects.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 51.



That's what they're saying about the

American Roofer's Hoist

RATING:

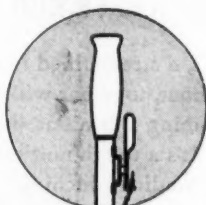
500 lbs. Single Line Pull

DRUM CAPACITY:

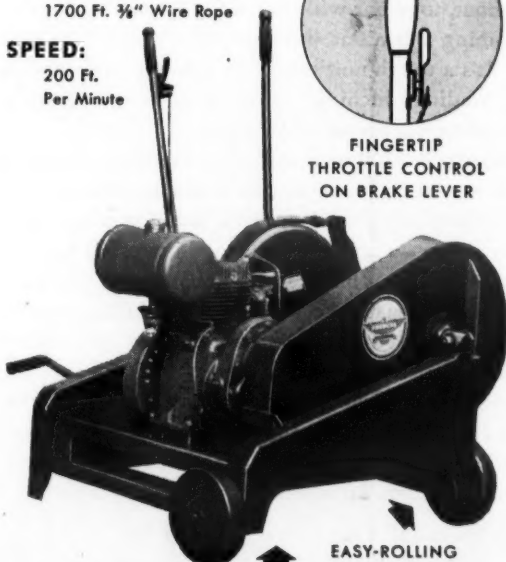
400 Ft. 3/4" Manila Rope
1700 Ft. 3/4" Wire Rope

SPEED:

200 Ft.
Per Minute



FINGERTIP
THROTTLE CONTROL
ON BRAKE LEVER



WELDED STEEL PLATE FRAME
WITH SLOT FOR
COUNTERWEIGHT TIMBERS

EASY-ROLLING
STEEL WHEELS

How does this sound, as a new way to reduce costs on both big and small construction jobs:

The AMERICAN Roofer's Hoist rides to the job on any light pick-up truck or trailer. You lift it up like a wheelbarrow, roll it down a couple of planks and wheel it right to the spot where you want it. Insert a heavy plank into the slotted frame and weight it down as needed. Then, rig your line to the roof, pull the starter cord on the engine, and you've got the job moving... in a matter of minutes. 500 lb. loads go up at a speed of 200 feet per minute.

Operation is wonderfully simplified. Finger-tip throttle control is right on the brake lever. Big 14" disc clutch, and 16" external band brake, give instant, accurate control of the load. Engine is governor-controlled at all speeds.

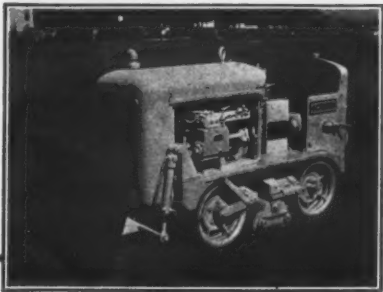
The AMERICAN Roofer's Hoist is really new... really different... really perfected. Three years of punishing tests by the world's largest manufacturer of hoists assure complete efficiency, safety, and satisfaction on the job.

Call your distributor, or write us direct, for prices and Catalog C-1. Immediate delivery from stock.

American Hoist
and DERRICK COMPANY
St. Paul 1, Minnesota

Plant No. 2: So. Kearny, N. J.

Sales Offices: NEW YORK • CHICAGO • PITTSBURGH



The Schramm Model 60 compressor is mounted on rubber crawlers and has forward speeds ranging from 1 to 12 mph. It is shown here with a bulldozer attachment.

Compressor Mounted On Rubber Crawlers

A self-propelled air compressor mounted on rubber crawlers is announced by Schramm, Inc., West Chester, Pa. The Model No. 60 compressor has four forward speeds ranging from 1 to 12 mph and one speed in reverse. Among the features claimed for it are hydraulic steering, crawlers separately operated by means of two steering levers, and electric starting.

A hydraulically operated backfill attachment is available as a special accessory. Recommended by the company for light grading and backfilling, it is designed to lift to 14 inches above ground level and to depress to 11 inches below. Other accessories include a power take-off and a sickle-bar type of grass cutter.

The Model 60 crawler-mounted compressor can be used to run air-driven equipment such as paving breakers, chain saws, rock drills, backfill tampers, trench diggers, tie tampers, clay diggers, paint sprayers, sump pumps, sand blasters, weed burners, and demolition tools. It is 32½ inches wide, 51½ inches high, and 88 inches long including the draw bar. Total weight of the unit is 2,600 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 17.

Snap-On Couplings Are Interchangeable

A specially designed snap-on coupling for use with flexible tubing is announced by the Ronaflex Tubing Co., Inc., Packard Bldg., Philadelphia 2, Pa. These couplings feature interchangeability on nipples of various sizes. For instance, the company points out that the ¾-inch Ronaflex coupling body will fit the ¼, ⅜, and ½-inch nipples. Also, the ¼ and ½-inch bodies will fit these same three nipples.

The degree of interchangeability varies with the type of coupling and with its size. The 1½ and 2-inch couplings, it is explained, are interchangeable only with the 1½ and 2-inch regular couplings. The principal advantage of this new design is that only a relatively few sizes of assemblies are needed to fit all sizes of nipples from ¼ to 2 inches. This improvement was developed for Ronaflex by Associated Consultants & Co., engineers.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 81.

Pocket Electrode Guide

A new pocket guide to Airco arc-welding electrodes has been issued by Air Reduction Sales Co., Department A 1924P, 60 E. 42nd St., New York 17, N. Y. It is thumb-indexed for ready reference, and section titles include mild steel, high-tensile steels, non-ferrous and cast iron. The data on each electrode mentioned in the new guide include a description of it, recommended applications, and welding procedure.

The guide also presents an easy-to-read electrode-selection table which gives the operator complete information

on which electrode to use for a particular job, its chemical analysis, and its mechanical properties. It features a two-page NEMA standard color marking chart and an electrode-comparison chart which matches up the various electrodes on the market with their respective American Welding Society and American Society for Testing Materials classification.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 62.

P-M Purchases Universal

The assets and business of the Universal Engineering Corp. of Cedar Rapids, Iowa, have been bought by the Pettibone Mulliken Corp. of Chicago. Universal manufactures a complete line of crushing machinery and allied equipment for rock and gravel plants. The acquisition rounds out the P-M line which already includes materials-handling and loading equipment, and portable batch asphalt plants.



The Everett trencher, shown here in raised position on a Ferguson tractor, can dig ditches 12 to 18 inches wide and 42 inches deep. It is lowered to digging position by the tractor's hydraulic system.

Ditch-Digger Unit Is Tractor-Mounted

A tractor-mounted trencher which can be used to dig ditches from 12 to 18 inches in width and 42 inches in depth is distributed by The Tractor Sales Corp., 1409 Santa Fe Ave., Los Angeles 21, Calif. Manufactured by the

Everett Mfg. Co. of Phoenix, Ariz., it is said to travel at speeds of from 1½ to 5 fpm, depending upon the depth and width of cut and type of soil.

Among the features claimed for the Everett trencher are these: a special transmission for necessary speed reductions, low-cost operation, safe operation, and easy maneuverability. The trencher is designed for mounting on Ferguson tractors, and is driven from the tractor's power take-off. The diggers are raised and lowered by the tractor's hydraulic system.

Further information may be secured from Tractor Sales, or by using the enclosed Request Card. Circle No. 41.

Halloran Joins Foley Bros.

Captain Paul J. Halloran, (CEC) U. S. Navy, has been elected Vice President of Foley Bros., Inc., international engineering construction firm of Pleasantville, N. Y. Just prior to his retirement, Captain Halloran served as District Civil Engineer, 5th Naval District.

HITTING A NEW HIGH... *in low loading Cost!*



OLIVER "70"

Industrial Wheel Tractor with Ware Front End Loader

The Oliver "70", a streamlined industrial tractor with modern engineering throughout, together with the Ware Front End Loader attachment, is fast becoming a familiar sight around construction jobs that move. It's a tough unit that bites into the high cost of such jobs as hauling, loading, ditching, filling in, or removing snow . . . plus performing a score of other tasks.

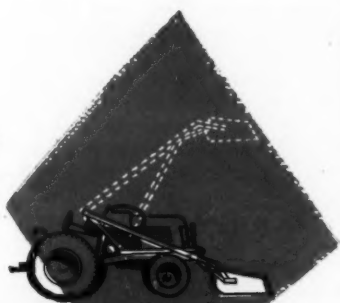
Then, too, the Oliver Industrial "70" with the Ware Loader is compact . . . well balanced . . . low to the ground so that it can operate in tight quarters. It makes handling gravel, cinders, loam or other loose material a pushover. Here's a unit that will load up to 8½ feet . . . dump at any height. Substitute a blade for the bucket and you have one of the huskiest, easiest-to-get-around backfillers you've ever seen in operation.

You "go longer" per gallon of fuel because the "70" with the Ware Loader is equipped with the 6-cylinder "Fuel Miser" engine. Drop in at your Oliver Industrial Distributor. Learn firsthand about the many new engineering features that will help you hit a new high in lower loading costs!



The OLIVER Corporation

INDUSTRIAL DIVISION: 19300 EUCLID AVENUE, CLEVELAND 17, OHIO



A bucket close to the rear when digging, for with high forward reach for loading.



Only one lever controls and operates the bucket!



Loaded . . . bucket up . . . you can move a full ton . . . accomplish more . . . faster!



Substitute a blade for the bucket and you have a fine working backfiller.

Low-Cost Secondary Roads Built in N. C.

Types of Construction Adapted to Three Areas Of State to Make Best Use of Local Materials

By T. V. FAHNÉSTOCK, Bituminous Engineer, North Carolina State Highway and Public Works Commission

NORTH CAROLINA'S post-war secondary-road construction program started with unusual impetus, for two reasons. First, none of these roads could be built during the war years. This alone had caused the demand for roads to be very insistent. On top of this, the winter of 1945-1946 was one of the worst on earth roads for many years. When traffic on the unpaved secondary system began to bog down during that winter, the clamor for roads came from the populace, including most of the newspapers and radio stations, in no uncertain terms. Needless to say, we have been in high gear ever since.

The North Carolina Highway Commission is responsible for the maintenance of over 62,000 miles of streets and roads in the state. Of this mileage, 48,500 miles are not paved. Therefore, there is plenty of room in which to work.

Approximately 92 per cent of the traffic on the secondary farm-to-market roads is local. So in order to serve the people best, it is necessary to construct the roads where they live. It is the Commission's policy to construct them on reasonably safe alignment and grade, securing as much sight distance as feasible, but in all cases to build the roads in a location which will best serve the local citizens. In order to do this, it is generally necessary to follow the old roads; however, we do try to ease the worst curves, both vertical and horizontal.

An effort is made to estimate the potential increase in traffic which may be expected after the road has been improved, and this expected traffic determines to a large extent the alignment and grades used. In all cases, adequate drainage must be provided.

The state is divided into three general topographical classifications—the coastal-plain, the Piedmont, and the mountainous areas. These sections lend themselves to different types of construction, and we try to adapt the types to the soil conditions in order to make the best possible use of local materials in the construction of base courses and pavement.

Coastal-Plain Area

Throughout most of the coastal-plain area, there is plenty of sand and sand-clay. Where both materials are available, they are used for the construction of soil-type base courses. Where only sand is available, cold or hot-mixed sand-asphalt is generally used.

Construction of the soil-type base courses has been pretty well standardized. Before work starts—or, if the base is to be built by contract, before bids are received—an investigation is made to locate suitable materials in the vicinity of the project. Samples from available deposits are tested by the Soils Laboratory. And, in the case of sand-clay, the proper proportions of sand and clay are shown on a sketch map which indicates the location of deposits. Practically all of the soil-type base courses in the coastal-plain area require artificial mixing to obtain a base complying with North Carolina's specifications. These specifications are in accordance with Public Roads Administration's recommendations, and are generally familiar. The thickness of soil-

type base courses is designed in the Soils Laboratory, based on subgrade conditions and expected traffic; it varies from 3 to 8 inches, with an average of about 6 inches compacted thickness. The bases are constructed a foot wider than the width of the proposed pavement.

In cases where the material in the subgrade is satisfactory for use in the base, the subgrade is shaped to the desired cross section; then the proper amount of the other component of the base is hauled in and spread, and the two materials are mixed to a uniform consistency. The mixing is done by motor graders, plows, harrows, and

rotary mixers. The base is then compacted by tamping rollers and pneumatic-tire rollers, and water is added during the compacting when necessary.

The soil-type bases are generally given a bituminous surface treatment. This consists of a prime application of 0.3 gallon of light tar or medium-curing cut-back asphalt. As soon as the prime has thoroughly cured, the road receives a second application of 0.4 gallon of 150 to 200-penetration asphalt. This is covered with 42 pounds of 1¼ to ½-inch aggregate and rolled immediately by a 5 to 7-ton roller.

Traffic is permitted to use this surface treatment for about 10 days, then a seal of 0.4 gallon of rapid-curing cut-back asphalt and 22 pounds of ½-inch aggregate is applied. Due to the friable nature of most aggregates available, the cut-back asphalt and aggregate are mixed with a long base broom drag. This oper-

ation coats the seal aggregate with asphalt and also helps to fill the voids in the first application of treatment. Immediately after dragging, the seal is rolled and kept closed to traffic until the cut-back asphalt has cured to such extent that the seal will not be displaced by traffic.

Since North Carolina's post-war construction program started, the supply of aggregate for surface treatment has not met the demand. Therefore a considerable mileage of soil-type bases has been covered with hot-mix sand-asphalt. In a number of cases, bituminous surface treatment has been placed in competition with an asphalt prime and 100 pounds of sand-asphalt per square yard. Where the mileage involved was considerable and local sand for the sand-asphalt was available, this type has proved cheaper than the surface treatment.

(Continued on next page)

Adams advantages pay off for Morrison-Knudsen!



The extension of the Los Angeles Airport by Morrison-Knudsen was a soil-cement job involving exacting operations—grading, mixing, spreading and finishing.

One of the busiest machines on this M-K job was the Adams Motor Grader pictured above. First of all, the machine handled the original sub-grading. Then came windrowing of the material for the mixing machine. Lastly, the soil-cement mix was spread and finished to rigid specifications.

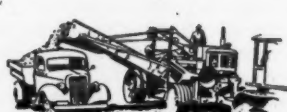
To finish fast-setting soil-cement mix to exacting specifications calls for working at highest possible speeds, plus real precision control. Adams 8 overlapping forward speeds, coupled with positive-acting mechanical controls, provided exactly the right combination to meet every requirement of this M-K job. And you can depend on it—Adams advantages pay off in a big way on every type of grading operation. For full information on the world's most complete line of motor graders, see your local Adams dealer.

J. D. ADAMS MANUFACTURING CO. • INDIANAPOLIS, INDIANA

ONLY ADAMS OFFERS ALL THESE OUTSTANDING ADVANTAGES

- 8 Overlapping Forward Speeds
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- World-Wide Dealer Service

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MOTOR GRADERS • LEANING WHEEL GRADERS • ELEVATING GRADERS

Low-Cost Secondary Roads Built in N. C.

(Continued from preceding page)

Specifications for sand-asphalt pavement permit the use of three different gradings of sand and cover wide gradation limits of natural sand; they also permit the use of stone screenings. It is sometimes necessary to combine sand from two different pits to achieve the desired grading, but generally local sand may be secured within a reasonable haul throughout most of the eastern and southeastern sections of the state.

The hot-mix sand-asphalt is prepared in either weigh-batch or continuous-mix plants. The bituminous material used is 85 to 100-penetration asphalt, and mineral filler is sometimes added to the surface-course mixture.

In locations where suitable clay does not occur for a soil-type base course but where sand is available, the base and surface are both constructed of sand-asphalt. On good subgrade we have used as little as 1½ inches of sand-asphalt base material and 1 inch of sand-asphalt surface-course material. For heavier traffic the thickness is increased, and about the heaviest section used is 3½ inches of base and 1½ inches of top.

Cold-mix sand-asphalt is often placed in competition with the hot-mix. Usually the cold-mix is required to be 1 inch thicker than the hot-mix. Cold-mixed sand-asphalt, or as it is designated in North Carolina specifications, sand bituminous surface course, is composed of local sand mixed with rapid-curing cut-back asphalt. This type is especially adapted where suitable sand occurs in the subgrade. Where suitable sand does not occur in the subgrade, it is hauled in from local pits. Traveling plants do the mixing. This type of pavement would be much less expensive if it were not for the weather hazard involved in the construction. A wet season presents serious difficulties in the final aeration and compaction of the mixture.

Our experience with this type of pavement, the sand bituminous surface course, has been satisfactory. It is usually constructed to a compacted thickness of 4 or 5 inches and serves as a base and wearing surface. When constructed over poor subgrade, an insulating layer of sandy material is used beneath the pavement. The sands which have been used in the mix cover all ranges of gradings, from coarse hydraulic material to very fine pit sand. The bitumen content varies, depending on the grading and stability of the aggregate, from 3 to 6 per cent.

This type of construction was used on a project built in 1937 at Wrightsville Beach. The sand used on this job was pumped from the Sound and the mix was very soft and unstable. A surface treatment consisting of 0.35 gallon of 150 to 200-penetration asphalt, covered with 40 pounds of 1¼-inch stone per square yard, was applied in the early spring of 1938. This pavement, which is 46 feet wide, has stood up remarkably well under traffic as well as parking on one outside lane. On some projects where the sand was stable, traffic has been using the mix without a surface treatment for over 10 years. But in general, it is found advisable to apply a light surface treatment after 5 or 6 years' use.

Piedmont Area

In the Piedmont section of the state, topsoil is found in some localities which can be used for soil-type base-course construction. This material usually occurs 6 to 10 inches thick in fields where continued cultivation has caused the excessive clay to leach out. While excellent bases can be constructed using topsoil, this material is becoming very difficult to obtain due to the objections of the property owners.

About the only sand in this area is obtained from creeks and rivers. Where it is available, such sand is mixed with the clay occurring in the subgrade to form a soil-type base.

When neither topsoil nor sand can be obtained, we use a crushed-stone base designated in our specifications as traffic-bound macadam or a portland-cement stabilized base. Local stone deposits suitable for the traffic-bound macadam occur infrequently in the Piedmont area; therefore, most of this material must be obtained from commercial quarries. Here again we have run into the shortage of commercial aggregate. For this reason, in 1946 we placed the portland-cement stabilized

base courses in competition with the traffic-bound macadam bases. In practically every instance the soil-cement base proved less expensive. As a result of this, up to November 1, 1947, we had constructed over 250 miles of this type of base. Most of the work was done during 1946-47, although several experimental projects were constructed 6 to 10 years ago.

The topsoil, traffic-bound macadam, and soil-cement bases are all surface-treated with the same type of treatment used on sand-clay base course. In some cases we have used an asphalt prime and 100 pounds of sand-asphalt per square yard as the pavement.

Several contractors on the soil-

cement construction have used P&H or large Wood Roadmixers for mixing the materials, while some are using motor graders, plows, harrows, and rotary mixers. Both methods have given very good results. Soil-cement bases are constructed to a compacted thickness of 6 inches, and the quantity of cement to be used is determined by the Soils Laboratory.

Due to the amount of work it faces and its limited personnel, the Soils Laboratory has not been able to give as close supervision to this construction as is desirable. In spite of this, no serious difficulties have been encountered and the failures have been negligible.

(Concluded on next page)

As Far Ahead in Road Building and Servicing as



SIMPLIFIED SERVICING

All adjustments are unusually accessible.

All fittings or lubrication points readily reached — none under tractor. Draining transmission final drives and engine crank case are the only operations which need to be done from beneath the tractor.

Types of oils and greases needed are cut to a minimum.

FASTER, EASIER SERVICING, MEANS LESS "DOWN TIME". . . LESS COST PER OUTPUT. SIMPLIFIED MAINTENANCE MEANS BETTER MAINTENANCE!

ONLY 3 LUBRICATION POINTS No daily lubrication by:

- AT 75 HOURS** — drain engine oil. . . . change lubricating oil. . . . check final drive, transmission, hydraulic steering. . . . only 3 grease fittings: 2 on converter; 1 on engine clutch.
- AT 200 HOURS** — drop oil in cup and generator. 4 fittings; fan, fan and universal joints.
- AT 1,000 HOURS** — change oil in final drive. . . . lubricate truck wheels, and support rollers.

Mountainous Area

In the mountainous area of the state we depend almost entirely upon stone or creek gravel for bases for secondary roads. Fortunately, deposits of stone or gravel occur generally throughout the area, and it is seldom that material for a base course has to be shipped. These bases are constructed 6 to 8 inches thick.

The Highway Commission has 20 surface-treatment outfits which are operated by state forces. These do practically all of the retreatment work and in 1946 placed 480 miles of new surface treatment on secondary roads. All drainage, grading, and base work on these roads was also done with state

forces and equipment.

Within the past year five Model 36 Wood Roadmixers have been purchased. These machines have been used in constructing 80 miles of new sand bituminous surface course and 28 miles of resurfacing old pavements.

When letting work to contract, it has been the policy wherever possible to do the light grading and shaping as well as the installation of small drainage structures with state forces and equipment. Then bids are received for the base course and pavement. It is believed this results in an appreciable saving, as the contractors do not care to do this light work. Due to difficulty in obtaining equipment, it has not been

possible to follow this arrangement in all cases.

In 1946, 541 miles of new pavement were completed by contract which, with the state work, gave a total of 1,021 miles. In 1947 the total, with our forces and by contract, was approximately 1,300 miles.

In conclusion it may be well to say that the secondary roads which we are building are relatively low in cost only when compared with the higher types. It certainly has not been possible to construct anything at a low cost within the past two years.

Prepared for the Committee on Road Design and Construction, Southeastern Association of State Highway Officials, and presented at its annual meeting in December, 1947, at Miami, Fla.

Heavy-Duty Air Hose

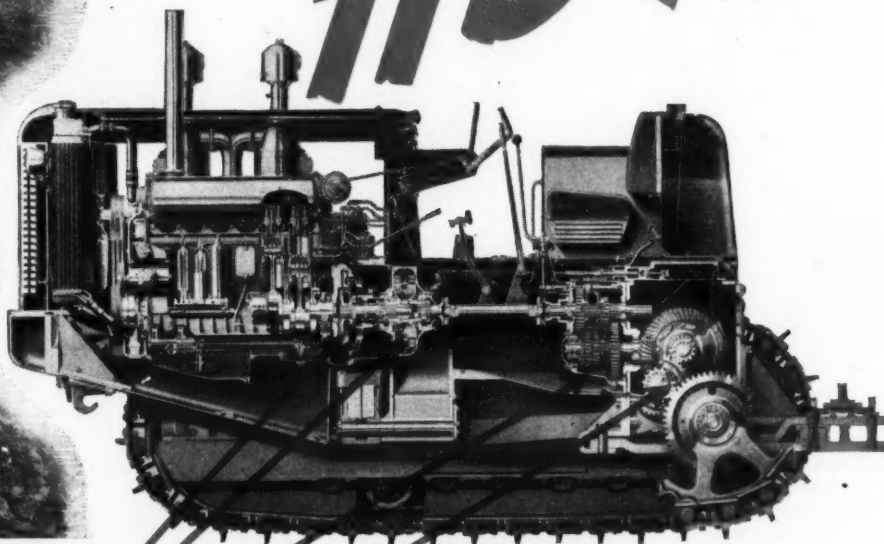
A new line of air hose for rugged service has been developed by Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J. The Condor Homo-Flex hose features flexibility and an extra-strong tube compounded of Manhattan oilproof Flexlastics, two braids of heavy-strength member, and a thick abrasion-resistant oilproof Flexlastics cover.

Two sizes are being made— $\frac{3}{4}$ and 1-inch inside diameters—with working pressures of 350 and 300 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 65.

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HD-19



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Each steering clutch removable independently of final drive or bevel gear.

Special tools cut to minimum.

Complete stocks of replacement parts—made in same factory to same exacting specifications as are on original tractor—are carried by Allis-Chalmers dealers.

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TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

★
ORIGINATOR OF THE TORQUE CONVERTER TRACTOR



A Caterpillar diesel D8 tractor equipped with a Caterpillar No. 88 bulldozer blade clears slashings in the warehouse area at Hungry Horse Dam site in Montana. The equipment is owned by the S. Birch & Sons Construction Co., which had the contract for clearing Hungry Horse town site and building and paving several miles of streets.

AGC Directors Meet, Discuss Price System

The basing-point price system, and its effects on construction work, was one of the major points discussed at the September meeting of the Governing and Advisory Boards of The Associated General Contractors of America, Inc. This system has been abandoned by many materials producers since the April 26 Supreme Court decision outlawing the delivered-price system in the cement industry, and is being replaced by an f.o.b. pricing system.

The board meeting presented the first opportunity for general contractors from all parts of the country to compare their experiences and assess the effect of the pricing changes on contract construction work. Among the principal speakers at the meeting was William Simon, General Counsel for the Senate Committee on Trade Policies. The committee was set up to investigate the effect upon business of sellers absorbing freight costs in meeting competitors' lower prices.

Other subjects on the agenda included: the operation of the National Joint Board for the Settlement of Jurisdictional Disputes; the impact on construction supplies of the voluntary industry agreements, under the Anti-Inflation Act, to channel critical materials to essential users; and the AGC's program to organize 100 reserve construction units in the Army's Affiliation Program.

In addition, round-table discussions were held by contractors representing each of the three main types of construction work—building construction, highway construction, and heavy construction and railroad work.

Steel Sidewalk Bridges

One of a contractor's prime responsibilities when he starts construction on buildings in municipal areas is to provide a sidewalk bridge which assures protection to the public. A line of steel bridges for this purpose is described in a booklet now available from The Patent Scaffolding Co., Inc., 38-21 Twelfth St., Long Island City 1, N. Y.

The booklet points out the reasons for the use of steel sidewalk bridges, explaining that they are built on public property and thus must conform not only to the builder's wishes but to a set of specified standards. It then explains how the Gold Medal units meet these safety requirements and still provide good-looking structures instead of eyesores on the city streets.

The catalog features a 2-page spread of pictures showing projects on which the Gold Medal bridges are in use. The catalog also shows, by means of photographs and text, how the bridges are constructed and erected. The specifications for the bridge, accompanied by a

blueprint, cover the posts, headers, connections, handrails, and other component parts. Also listed are several optional features available.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 82.

Groves Executive Dies

Bertus Patrick Larkin, Vice President, Director, and Eastern Manager of S. J. Groves & Sons Co., contracting firm of Minneapolis, Minn., died recently after an illness of several months. He was 67.

Mr. Larkin was well known in eastern construction circles, having built many highways, dams, and flood-control projects in New York, New Jersey, Pennsylvania, West Virginia, and the Middle West. He was a member of a number of professional groups, including the American Society of Civil Engineers, the American Road Builders' Association, and The Moles of New York City.

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UNIT CRANE AND SHOVEL CORP., 6309 W. Burnham St., Milwaukee 14, Wis., U.S.A.

Dual Concrete Road Built on Sand Base

Paver Between Forms Lays 22-Foot Lanes on 5-Mile Job; 4 Batches to a Truck Insure Material Supply

• **RUNNING** due north out of Lansing, Mich., U. S. 27 has been reconstructed from a concrete pavement of 18 and 22-foot widths to a modern, wide highway with a 44-foot concrete pavement. The 5-mile improvement began just outside the capital city and continued through the south part of Clinton County towards St. Johns.

For the lower 1½ miles the existing 20, and 22-foot concrete road was in good shape, having been completed only in 1940. This section was widened with an 11-foot lane on each side, increasing its paved width to 42 and 44 feet. The upper 3½ miles, however, was an 18-foot narrow and broken-down old concrete pavement laid back in 1923. This stretch was replaced with a dual highway, its 22-foot lanes separated by a median strip 10 to 15 feet wide.

The job was done by L. A. Davidson of Lansing, Mich., under a \$616,967.96 contract with the Michigan State Highway Department. Work on the necessary clearing and grubbing got under way in January, 1947. Dirt-moving began in May, but because of the heavy spring and summer rains no paving was possible until late in August. Making full use of all his time-saving mechanical equipment, and hauling 4 batches to a truck from his concrete batch plant to the dual-drum 34-E paver, the contractor finished the paving November 7 before cold weather could put a halt to operations.

Earth Work

On the lower end of the project the grading was essentially widening the fill to provide a subgrade for the 11-foot concrete lane that was added to each side of the existing pavement. On the upper 3½ miles the entire roadbed was raised as well as widened. The raise in grade averaged 5 feet over this stretch, and in some places was as much as 14 feet. As the old road was practically straight, no marked changes in the hori-

zontal alignment were necessary. The vertical alignment, however, was altered in some locations to increase the sight distances at the peak of vertical curves. The bulk of the roadbed excavation centered around such spots, and there also some of the old pavement had to be removed. Where the grade was raised, the old concrete was left alone and filled over.

Of the total 314,762 cubic yards of excavation included in the contract, 121,070 yards were dug out on the roadbed, and the remaining 193,692 yards came from two borrow pits. All of the borrow material was a fine, loose sand that made a good base for the concrete pavement. It was spread to a depth of at least 15 inches wherever pavement was to be laid.



C. & E. M. Photo

This Pioneer portable sand and gravel-washing plant saw service on the Lansing 5-mile concrete job. The Lorain dragline shown in the background used a Page 2-yard bucket to feed sand to the plant.

The borrow-pit sand was dug by two Lorain shovels—a 1¾-yard Model 80 and a 2½-yard Model 820. These loaded to 6 Diamond T trucks carrying 12 yards each, and to 5 bottom-dump Euclids, 4 of which held 16 yards and the other

25 yards. The average haul from the pits, which were ½ mile back from the highway, was 1.3 miles. The sand was dumped on the roadbed and spread by two Caterpillar D7 tractor-dozer, and

(Continued on next page)



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Fuel consumption is held to a minimum because the engine speed keeps exact pace with air demands, thanks to the CP gradual speed regulator. This and other CP features effect fuel savings of 15% to 35%. On the CP-500 Diesel-driven compressor illustrated,

the six-cylinder Caterpillar D-13000 engine and the V-8 arrangement of compressor cylinders are further features that make for smooth, economical performance.

CP Portable Compressors are available in gasoline-driven models of 60, 105, 160, 210 and 315 c.f.m., actual capacity, and in Diesel-driven models of 105, 160, 210, 315 and 500 c.f.m. Write for full information.



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Dual Concrete Road Built on Sand Base

(Continued from preceding page)

shaped by a Caterpillar No. 12 motor grader.

Where the 20,000 square yards of existing pavement had to be removed, the old concrete was first broken up either by a heavy weight dropped from a crane, or by a truck-mounted pavement breaker. The latter was fitted out with a 1,500-pound weight that dropped 3 feet. The broken rubble was loaded into the trucks by a 2-yard dragline and wasted off the road.

Grading along the roadway was done with 3 LeTourneau LP Carryalls, averaging 14 yards to the load, which were pulled by D8 tractors. These units hauled up to 1,200 feet. The fills were placed in 10-inch lifts, and were compacted sufficiently by the passage of the heavy equipment. The grading was done over the full width of roadway since the road was closed to traffic during the construction. Paralleling state and county roads, though narrow, furnished good detours.

New Highway Section

On the dual highway the 22-foot pavements have a center crown of 1 1/4 inches, and are flanked on the outside by 10-foot shoulders with a slope of 3/4 inch to the foot. Where the fills are under 8 feet high, the side slopes are 4 to 1. In fills over 8 feet, the slopes are 2 to 1 and are protected with guard-rail. In cuts the backslopes are usually 4 to 1, except where the width of the right-of-way did not permit, and then they are 2 to 1. For a 2-foot strip immediately adjacent to the pavement, the shoulders consist of stabilized and compacted gravel 6 inches deep. Later on, the maintenance forces of the State Highway Department will prime the shoulders and give them a double bituminous surface treatment.

The divisor or median strip, from 10 to 15 feet wide, is depressed at the rate of 1 inch per foot of slope to the low point at the center. This area is covered with 6 inches of topsoil and is seeded.

The concrete slabs are 9 inches uniform thickness throughout, reinforced with steel-wire mats placed 3 inches below the surface. Through one marshy area the pavement has two layers of mesh reinforcement, 3 inches from the top and also 3 inches from the bottom. No expansion joints were used in the pavement, and contraction joints were placed only every 100 feet. They consist of a steel plate and assembly furnished by the Union Steel Products Co. of Albion, Mich. Through the joints go 1 x 15-inch dowels on 12-inch centers. Across the center line of the 22-foot slabs a tie bar, 1/2 x 48-inch, was placed every 40 inches. These bars are embedded in the concrete 4 1/2 inches below the surface, and beneath the steel mesh reinforcing. The bars came from the Pittsburgh plant of the Bethlehem Steel Co., and the mesh from the American Steel & Wire Co., Joliet, Ill.

Batch Plant

At the south end of the dual-highway job, along the east side of the highway, the contractor set up his concrete batch plant. Paving equipment started at the dual lane on the east side, going north. When that stretch was completed, it returned to the south end of the dual-lane part of the project and paved the west side, again moving north. Then it returned to the lower or widening end of the job. The west widening strip was paved north to south, and the east side from south to north—ending at the batch plant. With that paving procedure, batch trucks could travel a large part of the time on pavement already placed and cured.

The plant was so laid out that the empty batch trucks returning from the paver left the road; ran through the



C. & E. M. Photos

The Cleveland form tamper at left works on Metaform 10-inch road forms which L. A. Davidson used for his 5-mile concrete improvement job on U. S. 27. Then the Buckeye Power Pinegrader shown above casts excess dirt from between the forms. Where the cast-off sand made too much of a pile, it was knocked down and spread out by the grader.

plant picking up their loads of stone, cement, and sand, in that order; then swung back on the road with a 180-degree turn; and continued north to the paving operations on the dual lane. For widening operations, they passed under

the bins and then proceeded south to the paver. No time was lost in backing up or jockeying into position at the plant bins.

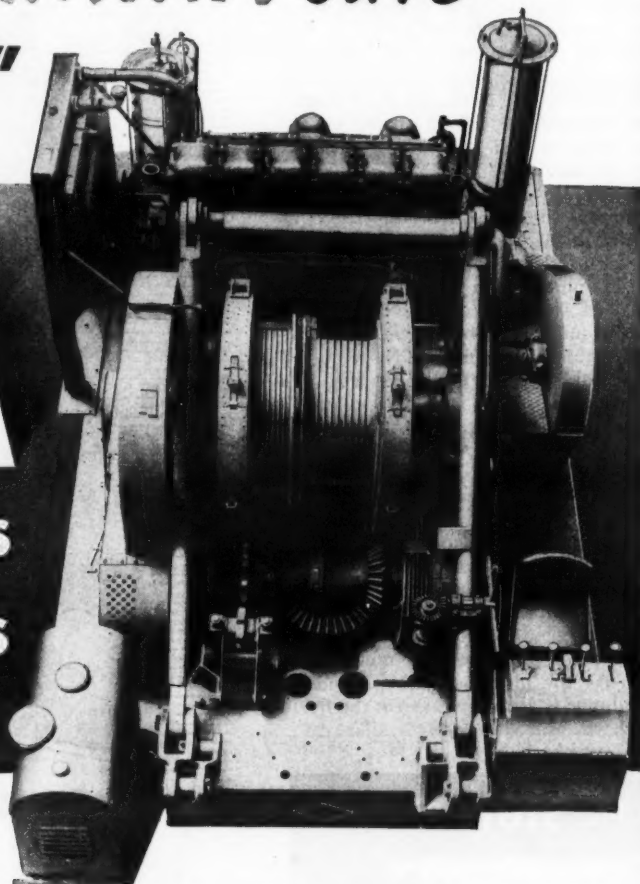
All the bins at the plant were Butler. Before the trucks reached the stone bin,

at the upper or north end of the plant layout, they rolled past a wooden platform where a man was stationed to scrape the truck bodies clean before the new batches of material were added.

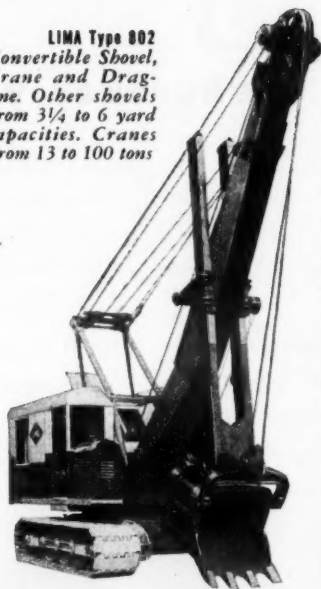
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Convertible Shovel,
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capacities. Cranes
from 13 to 100 tons



A LIMA user recently wrote us as follows: "It may be of interest to you to learn of the service we received out of our first LIMA."

"We used this machine on a double-shift basis for over a year and have not had any delay whatsoever other than a negligible delay caused by a loose fan belt."

"I have been using power shovels of various makes for years and personally feel this beats the record of any other shovel I ever used. I am highly pleased with your LIMA units." (Name on request. This customer now owns 8 LIMA machines and has one on order.)

An examination of the main machinery of any LIMA unit shows why such records are possible. In this clean-cut design, the fewest number of shafts are required to transmit power from engine to dipper. Important bearings including those in the drum are of the anti-friction type. Large drums (approximately 30 times the diameter of the cable) increase output with minimum cable wear. Permanently aligned shafts prevent chattering and grabbing of clutches. These are only a few of the reasons why we say:

LIMA Equipment STAYS ON THE JOB!

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He also closed the compartment doors inside the bodies which were opened at the paver by a pull on a release rope.

For batch hauling the contractor used a fleet of his 6 Diamond T trucks which were divided into four compartments, each holding an 8-bag batch. The average haul from plant to paver was 1.4 miles. With this hauling equipment of 4-compartment trucks, enough material was always on hand at the paver to keep the concrete pouring out between the forms. As soon as the last batch was emptied, the drivers left the scene quickly, thus avoiding congestion around the paver. They did not wait to clean their trucks or close the gates, as this was handled better at the plant.

The stone bin equipped with beam scales was divided into two compartments of 25 yards each, holding the 4A and 10A coarse aggregate used in the mix. The stone came from the Green Oaks plant of the American Aggregates Corp., 60 miles from the job site, at New Hudson, Mich. It was delivered to the job by trucks of the Mather Trucking Co. of Detroit, and stockpiled alongside the bin.

After picking up the stone, the batch trucks rolled on to get loaded under the cement bin. Air-entraining cement was supplied both by the Peerless Cement Corp. from Quincy, Mich., and the Consolidated Cement Corp. plant at Cement City, Mich. The bulk cement was hauled to the job, an average of 50 miles, in trailer tank trucks owned by L. J. Beal & Son of Brooklyn, Mich.

At the plant the cement was dumped into a hopper onto a worm gear that moved it along to an enclosed elevator. At the top of the elevator the cement discharged into a 235-barrel bin mounted on a steel platform under which the trucks drove to get loaded. When this smaller bin was filled, the flow of cement from the elevator was then shifted to an adjoining larger bin holding 346 barrels. If no supply trucks of cement were around as the smaller bin was emptied, it was filled with cement taken from the larger storage bin. The latter bin discharged its contents into the worm gear which moved the cement along to the elevator and thence to the 235-barrel bin feeding the trucks.

Sand Supply

Sand for the mix was dug out of a borrow pit 1/2 mile from the batch plant, then screened and washed. A Lorain dragline with a 50-foot boom and a Page 2-yard bucket fed the sand to a Pioneer portable sand and gravel-washing plant. From the hopper on the plant the material passed over a conveyor belt to a double-deck 4 x 12-foot screen with 1/2-inch and 3/4-inch openings. All the material retained on the screens was discharged through a conveyor out the side of the plant. The sand passing through was washed, and then discharged by way of an end conveyor into a couple of Studebaker 8-yard trucks. It was then hauled to the batch plant and stockpiled alongside a 50-yard bin.

From the stockpile the sand and stone bins were charged by a Lorain crane with a 65-foot boom and a Williams 1 1/4-yard clamshell bucket.

The gradation of the two kinds of coarse aggregate and the sand was:

Sieve Size	Per Cent Passing		
	No. 4A stone	No. 10A stone	Sand
2 1/4-inch	100	.....	.....
2-inch	95-100	.....	.....
1 1/2-inch	65-90	100	.....
1-inch	10-40	95-100	.....
3/4-inch	.....	35-65	.....
3/8-inch	0-5	.....	100
No. 4	.....	0-8	95-100
No. 8	.....	.....	65-95
No. 16	.....	.....	35-75
No. 30	.....	.....	15-55
No. 50	.....	.....	10-30
No. 100	.....	.....	0-10

The Mix

The weights of a typical 8-bag batch were as follows:

Cement	752 lbs.
Sand	1,788 lbs.
Coarse gravel, 4A	1,598 lbs.
Fine gravel, 10A	1,610 lbs.
Added water	25 gals.

The weight of the moisture contained in the aggregate is included in the preceding table. If the materials were surface-dry, 5 gallons of water was added for every bag of cement. While air-entraining cement was used in the mix, when the air content was low it was augmented by 8 ounces of a 10 per cent solution of Vinsol resin added to each batch to make the concrete



C. & E. M. Photo

All the bins in Davidson's concrete batch plant were Butler. Haul from plant to paver averaged 1.4 miles and was handled by Diamond T trucks which were divided into four compartments, each holding an 8-bag batch.

more workable and durable. A tank containing the solution was carried along on the paver. A dipper was used to measure out the 8 ounces.

Getting Ready

With the sand base course shaped up by motor graders, the 10-inch Metaform (Continued on next page)

STANDARD ENGINEER'S REPORT



TOUGHEST MOUNTAIN SERVICE PROVES RPM HEAVY DUTY
KEEPS TRUCK AND BUS ENGINES CLEAN

When this engine was pulled out of service for inspection, and the photographs were taken, it had operated on RPM Heavy Duty Motor Oil continuously for 45,000 miles—in service that is about as hard on equipment as any in the country. It is one of 21 units used on a mountain bus and freight run. They climb to a 5000-foot altitude in 15 miles without a stop. Even with 6-bladed fans, pressure-lubricated timing gears and 10-speed transmissions, crankcase temperatures soar above 240 degrees F.

As the pictures at right and above show, the crankshaft, bearings, pistons and rings from the engine were exceptionally clean. RPM Heavy Duty Motor Oil withstands the highest operating temperatures... sticks to the hot spots ordinary oils leave bare.

The camshaft was free from lacquer. Pushrods, timing gears and other parts showed minimum wear. RPM Heavy Duty Motor Oil resists oxidation, cleans engines of lacquer and maintains a tough lubricating film. It does this because of inherent properties of its selected base stocks and special compounds.

REMARKS: Many oils, competitive to RPM Heavy Duty Motor Oil, have been tested by Mountain Auto Line in their regular service. Tests have been made in all seasons of the year with atmospheric temperatures ranging from zero to 100°F. above zero in the shade. RPM Heavy Duty Motor Oil is the only oil used that meets every requirement of their engines and prevents clogging with lacquer.

STANDARD TECHNICAL SERVICE conducted and reported this test: If you have a lubrication or fuel problem, your Standard Fuel and Lubricant Engineer or Representative will give you expert help; or write Standard of California, 225 Bush Street, San Francisco 20.

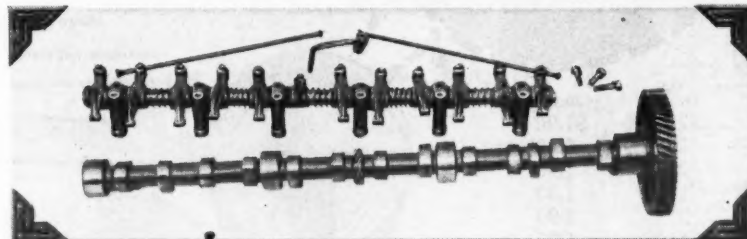
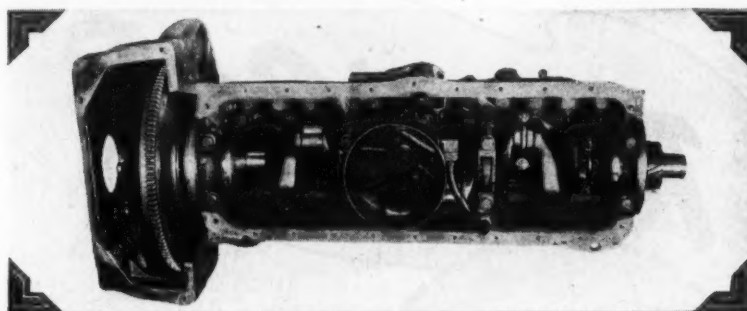
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C. & E. M. Photos
At left, a Diamond T 4-batch truck dumps to the skip of the Ransome 34-E dual-drum paver which worked on the U. S. 27 job in Michigan. At right, workmen set steel mesh reinforcement. Notice the water-tank trucks in the background.

Dual Concrete Road Built on Sand Base

(Continued from preceding page)

steel road forms were set by hand, pinned down, and then tamped firmly in place by a Cleveland form tamper. The contractor had on the job about 4,500 feet of forms, and always kept at least 600 feet of forms and grade ready ahead of the paver. A Buckeye Power Finegrader then rolled over the forms to remove all surplus material, casting the excess dirt off to either side. Where the cast-off sand made too much of a pile, it was knocked down and spread out by the grader. The

insides of the forms were then oiled from a portable spray can.

The dual highway was paved the full 22-foot width of each of the lanes. At the beginning of the job, the Ransome 34-E dual-drum paver worked from the median strip, but the rains messed up the surface of this depressed clay strip so that the going was rough on the trucks as they maneuvered to dump their batches into the skip. Some spillage also accompanied the dumping, so the paver was shifted to a position between the forms. Gaps were left in the rails for the trucks to back down a short distance to the paver. As the latter advanced, the opening was closed and

(Continued on next page)

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The Hydrocrane is completely hydraulic — hydraulic finger-tip control telescopes, raises, and lowers the boom, sets the outrigger, hoists the load, swings the boom 370°, and opens and closes the bucket without the operator leaving his seat.

It's the simplest crane on the market — no clutches, drums, gears, brakes; only one engine powers the truck and crane — thousands of parts have been eliminated. That is why your initial investment is lower, operating costs are lower, and maintenance costs are far less than any other crane—enabling you to handle more jobs, faster, cheaper and more profitably.

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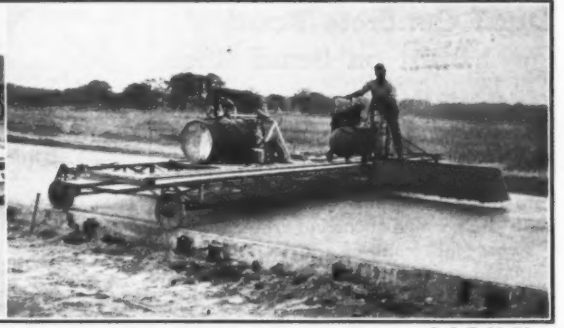
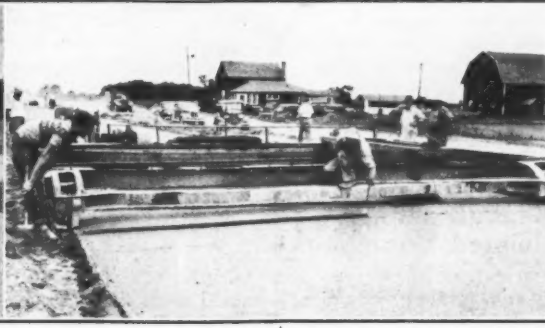
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5x	1 3/4"	1.90
6	1 1/2"	1.90
66	1 9/8"	1.90
7	2 1/2"	1.90
8	3"	2.50
9	3 1/4"	2.50
10	3 1/2"	2.50
11	3 3/4"	2.75
115	3 3/4"	3.00
12	4"	3.00
123	4 1/8"	3.00
125	4 1/4"	3.00
14	4 1/2"	3.00

WATERLOO FOUNDRY CO., WATERLOO, IOWA



C. & E. M. Photos

The Jaeger-Lakewood double-screed finisher shown in the first photo followed the paver on the Davidson job. From the front of the Koehring Longitudinal Finisher which was next in the line-up, workmen inserted metal strips into the concrete at the contraction joints (second photo). The concrete was cured with Tru-Cure compound sprayed from a W. G. Chausse machine carried along on a 4-wheel bridge (third photo).

a new gap farther up the line was made.

The final shaping of the subgrade was done by a Cleveland Trailgrader, towed along by the paver, which smoothed out the subgrade and cut it to the true grade. A flat piece of steel was laid on top of the Trailgrader to catch any concrete that might spill over as the bucket was being filled from the paver drum.

Where the contraction joints were to be placed at 100-foot intervals, two wooden boxes, each 11 feet long x 14 inches wide x 5 inches deep, were laid out between the forms. The concrete was later dumped over this long wooden space filler, but the boxes were then lifted out leaving a slot in the concrete into which the contraction joint and assembly were placed.

To prevent infiltration of foreign material into the contraction joint, a strip of 1/4-inch mastic board, 11 inches wide, was laid under the joint. This strip extended across the full width of the pavement and also up along the sides of the forms to within 2 inches of the surface of the concrete. The Concrete Steel Fireproofing Co. of Detroit supplied the mastic material for these strips, and also for the center-line ribbon.

Paving and Finishing

Water for the mix was pumped from a creek on the job by a Chrysler Army-model 2 1/2-inch pump into a 1,500-gallon tank mounted on a flat-bed truck. On this truck was a Jaeger 2-inch pump which was used to transfer the water to a 1,800-gallon tank truck which was always stationed at the paver. Another Jaeger 2-inch pump on the latter truck pumped the water to the tank on the paver through a 100-foot length of 2-inch hose. With this set-up and the long hose, only one driver was needed for the two trucks. When the driver with the smaller tank truck was getting a supply of water from the creek, the paver drew on the storage tank truck which was parked just outside the forms. When the supplying truck returned, the driver moved the storage truck ahead, filled it with water, and then returned to the creek with the supplying truck for another load.

The batches were mixed 1/2 minute in each of the dual drums on the paver, or a total of 1 minute, and then deposited on the subgrade from the

40-foot boom of the Ransome 34-E. Besides pulling along the Trailgrader, the paver also towed a steel strike-off which rode the forms on a 4-wheel carriage. This contractor-made piece of equipment, pulled by cables, was kept about 10 feet behind the paver. It was used to cut the concrete down to a plane 3 inches below the finished surface. After it passed, the steel-wire mesh reinforcing was set in place. More concrete was then added to complete

the full depth of slab. The strike-off carried a Jackson vibrator which was used along the edges of the forms and at the contraction joints.

The surface of the concrete was then finished by a Jaeger-Lakewood double-screed finisher, which was followed by

a Koehring Longitudinal Finisher. On the back end of the Koehring machine a 6-inch steel wheel was rigged up at the mid-point. It cut a 2 3/4-inch-deep longitudinal center-line slot in the concrete. Also at the back of the Koehring

(Concluded on next page)

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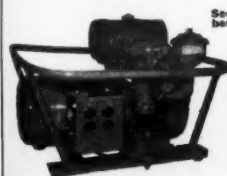
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HYATT ROLLER BEARINGS

Dual Concrete Road Built on Sand Base

(Continued from preceding page)

unit was a platform from which a finisher inserted 5-foot lengths of mastic paper, 2½ inches wide x ¼ inch thick, into the slot. The paper was kept flush with the surface of the concrete.

From the front of the Longitudinal Finisher, two concrete finishers inserted metal strips 2 inches deep x ½ inch thick into the concrete at the contraction joints. Two strips, each 11 feet long, extended the full width of the slab. Later, when the concrete had set up slightly, the finishers from their 4-wheel work bridge pulled these metal strips, and edged around the joints with ¼-inch-radius edging tools. Along the sides of the forms a ¾-inch-radius tool was used for edging.

Behind the mechanical finishers the concrete was checked with a 10-foot straight-edge, and hand-floated with a board float 5 feet long. A 2-foot-wide strip of burlap, reaching across the full width of the slab, was then pulled over the surface to remove any laitance, and to roughen the concrete slightly so that it would not be too smooth or slippery.

The concrete was cured with Tru-Cure compound sprayed on the surface from a W. G. Chausse machine which was carried along on a 4-wheel full-width bridge. The 9-nozzle 4½-foot spray bar was covered with a hood to direct the spray down on the concrete. The machine was pushed back and forth across the bridge on a double track. Seven days later the concrete could take traffic, though it was not necessary because of the detours that were provided.

Later the contraction joints were poured with Sealz, a rubber joint compound supplied by the U. S. Rubber Co. The material was first heated to a temperature of 400 degrees F in an Aeroil oil-bath heater, and then poured into the cracks from a small spout can. The maintenance forces of the Highway Department applied the center-line stripe to the pavement.

The average production of 22-foot pavement for a 10-hour day was 1,000 linear feet.

Quantities and Personnel

The major items included in the contract were the following:

Removing old pavement	20,000 sq. yds.
Excavation	314,762 cu. yds.
Concrete pavement, 9-inch	110,989 sq. yds.
Concrete pipe, 12 to 18-inch	4,419 lin. ft.
Tile underdrain, 6 to 12-inch	10,000 lin. ft.
Concrete curb	4,500 lin. ft.

L. A. Davidson employed an average force of 60 men on the project. Gerald Benedict was his Superintendent, assisted by Andrew Zynda. For the Michigan State Highway Department, C. B. Laird was Project Engineer. The Department is headed by Charles M. Ziegler, Commissioner. Harry T. Ward is Chief Deputy Commissioner, and Scott A. Baker is acting Construction Engineer. H. C. Coons is Deputy Commissioner and Chief Engineer.

Powered Tail-Gate

A power-operated tail-gate is manufactured by Anthony Co., Streator, Ill. Designed to simplify truck loading and unloading operations, it is made in sizes to fit trucks of 1½-ton capacity and larger. A specially designed unit has also been made available for use on semi-trailers. The Anthony Lift-Gate is supplied complete with power take-off, drive shaft, control, and all fittings needed for installation.

The Lift-Gate is hydraulically operated through a power take-off, the control for which is located in the truck cab. Control of the gate is provided by a lever at the rear which can be mounted on either the right or left side of the truck. The Lift-Gate can be stopped at any elevation, and will automatically stop at ground or truck-bed level. Special safety latches are designed to hold it in place at the level of the truck bed and to prevent it from accidentally lowering while the truck is moving.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 1.

Data on Asphalt Plants And Related Equipment

Detailed information on a line of asphalt plants and related equipment is being distributed by The F. D. Cummer & Son Co., B. F. Keith Bldg., Cleveland 15, Ohio. Among the items listed are the Cummer, 1200 portable combination plant designed to produce from 50 to 80 tons per hour of hot-mix and 45 tons per hour of cold-mix;

mixers in 2,000, 3,000, or 4,000-pound capacities; a two-fire drier in two sizes; and a new-style Cummer mixing tower in two sizes.

The features of each of these units are listed and explained. Several of the units are illustrated, and so are some of the parts—the Cummer-Robins vibrating screen, internal-fire driers, combination drier-coolers, asphalt buckets, and mechanical feeders.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 45.

Diesel-Oil Additive

An additive for use with diesel fuel oils is marketed by the Industrial Chemical Corp., 12130 S. Main St., Los Angeles 3, Calif. Induco fluid is said to produce more power with more economical use of fuel, and at the same time to reduce oil sludging.

When added to diesel fuel, it is designed to take a chemical action against the sulphur, rosin, gum, and tar content in the fuel oil, and to turn them into substances that will ignite efficiently upon injection.

Among the advantages claimed for its use are cleaner screens and injectors, longer oil and compression-ring life, elimination of sludge and carbon, reduction of oil-change frequency, easier engine starting, and longer periods between engine overhauls.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 107.

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International UD-14A Diesel engine equipped as a complete power unit. The UD-14A, a 4-cylinder, 76 h.p. engine, furnishes the power for medium sized motor graders.

International UD-9 Diesel equipped as a complete power unit. The 4-cylinder UD-9 engine delivers 53 h.p. and powers smaller motor graders.

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INTERNATIONAL Industrial

Pocket-Size Viewer For Aerial Surveys

A pocket-size stereoscopic instrument for use in interpreting aerial surveys has been produced in a new model by the Fairchild Camera & Instrument Corp., 88-06 Van Wyck Blvd., Jamaica 1, N. Y. A feature of this unit is that it can be folded into the size of an ordinary eyeglass case.

The Fairchild Model F-271 is equipped with two meniscus lenses of $4\frac{1}{2}$ -inch focal length and $2\frac{1}{2}$ -power magnification. Both lenses swivel in and out of specially built recesses in the case, and may be adjusted horizontally over a range of from 50 to 72 mm. This adjustment is sufficient to accommodate differences in the interpupillary distances

of most observers, the manufacturer explains. When set up, the F-271 is 4 inches above the photographic prints. The two right-hand legs are spread 5 inches apart and are $7\frac{1}{4}$ inches from the left leg. All three legs fold into recesses designed for that purpose. Overall dimensions of the instrument are $5\frac{1}{4} \times 1\frac{1}{8} \times \frac{1}{2}$ inch. Total weight is $7\frac{1}{2}$ ounces.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 22.

Cableway System Reviewed

A 4-page digest on the features of its cableway installations has been prepared by Sauerman Bros., Inc., 522 S. Clinton St., Chicago 7, Ill. It describes

the working model of a 25-ton taut-line cableway which was on exhibition at the Road Show in Chicago. It includes facts about the construction of the unit and about Louis E. Dierks, its builder.

The folder also describes the use of the Sauerman taut-line cableways for construction of the Chastang Dam in France; for stockpiling operations in Tennessee; for digging sand and gravel in Wisconsin; for strip mining in the Tri-State mining area; and for mining and storing clay in Puerto Rico. The digest shows several interesting photographs taken at each of these jobs, and explains how the cableway system speeded up production on each.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 87.

Figures on Road Building Reach an All-Time Record

America's highway-construction program will hit an all-time high if present trends continue. In fact, at the present rate, it should reach a mark of \$1,750,000,000 in 1948. This figure was recently predicted at a meeting of road officials by Charles M. Upham, Engineer-Director of the American Road Builders' Association.

"October is our peak construction month", Mr. Upham stated. "In October, 1946, \$100,000,000 was spent in road building. In October, 1947, this rose to \$178,000,000. At this rate, October of 1948 should show a total expenditure of \$250,000,000". He also pointed out that this ratio holds true for the total yearly volume—\$772,000,000 in 1946; \$1,500,000,000 in 1947; and an estimated \$1,750,000,000 in 1948. However, Mr. Upham made it clear that these increases, while gratifying, are far from sufficient to overcome the deficiencies in the highway system. He added, "We must make even greater gains to restore and extend our highways".

Figures released by the Federal Works Agency show that contracts let by state highway departments for the first five months of 1948 amounted to 38 per cent more than the corresponding period of 1947. Federal Aid contracts awarded in May of this year were 30 per cent higher than those awarded in May, 1947. State highway contracts awarded in May, 1948, were 31 per cent above those of May, 1947; and total highway contracts at all government levels were 41 per cent higher.

The Department of Commerce reports that construction in all categories, public and private, is expected to reach a figure of \$18,000,000,000 in 1948—\$4,000,000,000 higher than the record established in 1947, and \$4,500,000,000 over the previous high reached in 1942. Total construction expenditures for the first seven months of 1948 amounted to \$9,400,000,000, 36 per cent higher than the corresponding period of 1947. Residential construction continues to lead other forms.

Airport-Pavement Design

The latest available data on the use of welded-wire-fabric reinforcement in airport-pavement design have been made available in catalog form by the Wire Reinforcement Institute, Inc., 1049 National Press Bldg., Washington 4, D. C. This 32-page manual has been prepared as an aid to the engineer in the design of airport landing facilities which conform to CAA requirements for projects planned under the Federal-Aid Airport Act. It describes drainage systems, sub-bases, and reinforced-concrete pavements for runways, taxiways, and aprons.

The material is presented in concise form and is supported by charts, tables, graphs, and formulae. It includes ASTM specifications for cold-drawn steel wire to be used for concrete reinforcement, ASTM specifications for welded steel-wire fabric, general specifications for welded wire fabric, and other information.

Copies of this literature may be obtained from the Institute. Or use the enclosed Request Card. Circle No. 113.

Atlas Powder Promotions

Several personnel promotions are announced by the Atlas Powder Co. R. K. Gottshall is now Assistant General Manager; W. E. Collins, Jr., succeeds him as Director of Sales of the Explosives Department; and George W. Thompson is transferred to Seattle as Manager of the district sales office in the Joseph Vance Bldg. Both Mr. Gottshall and Mr. Collins will establish their headquarters at the company's general office in Wilmington, Del.

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Power

Valve Care Affects Engine Performance

Why Poppet Valves Fail In Internal-Combustion Engines, and How They Are Properly Maintained

† A VALVE may be defined as a small mechanical device which is used for closing a passage. This definition is quite applicable to valves discussed in this article, since it is essentially the function of a valve in an internal-combustion engine to open and close a passage between the combustion chamber and the intake or the exhaust manifold.

Valves antedate the internal-combustion engine by many years, for they were required in the reciprocating steam engine from the very beginning. Although they are only a very small part of an engine and their cost is less than 5 per cent of its total cost, they are among its most important parts, for without them the modern internal-combustion engine simply cannot function. Their proper operation is essential both to good engine performance and to fuel economy.

The subject of valves is so broad that it cannot be treated completely in a short article. Therefore, the scope of this discussion will be limited to the development, proper functioning, and maintenance of poppet valves, the type most commonly used in present-day internal-combustion engines. Although a great deal of the material presented is of a general nature and pertains to the poppet valve in any type of internal-combustion engine, some of

the data pertain primarily to the automotive type of engine.

Demands on Valves

In order to understand the problems which have to be surmounted to assure proper valve functioning, consider some of the demands imposed on valves in internal-combustion engines. First of all, they are subjected to very high speed. For example, in an 8-cylinder car operating at 40 mph, the 16 valves open and close 840,000 times per hour. At even moderate speeds, the complete cycle of intake, compression, firing, and exhaust takes place in less than 1/25 second, during which time the valves must open and close. This operation must take place in 1/100 second or less.

During this cycle, exhaust valves and seats are exposed momentarily to temperatures as high as 3,800 degrees F, normally operating at cherry-red heat; even so they must maintain their hardness and form. They must also maintain their strength. For although each valve weighs only about 5 ounces, it must control and hold more than 14 hp and make a seal against pressures of up to 600 psi and greater. Also, they travel approximately 1/4 mile in their guides for every road mile.

With this in mind, it is easy to understand why the best metallurgy and precision manufacturing plus the greatest precision and skill in reconditioning and adjustments are required to assure good valve performance.

Development of Valves

There has been a great change in

valves from their early design to that used at present. This change has been necessitated by changes in the engine, such as increased compression ratio, greater power and speed, and fuel economy—all of which have made the function of valves increasingly more important, exacting, and difficult.

Some of the major changes in valves have resulted from research of metallurgists, who have developed valve metals which will withstand corrosion, abrasion, scaling, and burning, and not become distorted or lose their seating properties during severe operation. However, in spite of these advances and improvements, metallurgists have yet to develop a perfect valve steel. And since the demands on valves for different engines differ widely, the metallurgist often has to resort to combinations of materials to obtain a valve which gives satisfactory performance.

The metallurgist has been assisted by the automotive engineer, who has continually improved engine designs so as to lessen the demand placed on valves. Among the more pertinent contributions of the engineer are: sodium cooling, improved block and port design, efficient retainer locks, hard facing, good insert-seat design, constant clearance regulators (hydraulic lifters), improved valve motion through cam design, and positive valve rotation.

Sodium cooling has been perhaps the most outstanding advancement; being especially helpful in cases of chronic valve troubles. However, the installation of sodium-cooled valves must be accompanied by a thorough knowledge of the problem at hand, for it may re-

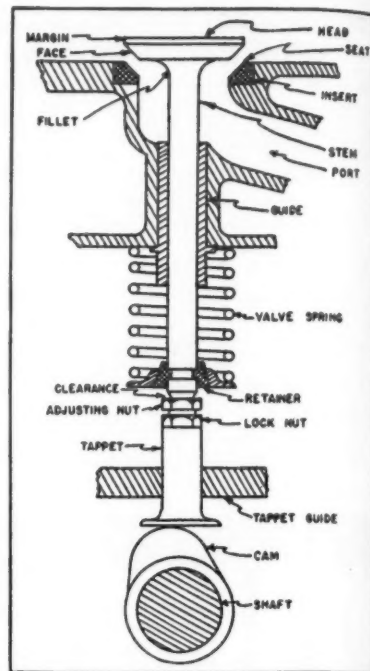


Figure 1. Valve assembly nomenclature.

quire the simultaneous modification of the seat, guide, or other parts in order to obtain the maximum beneficial effect.

Since there are some minor variations in the nomenclature used by various people for the valve and valve gear mechanism, the widely used nomenclature shown in Figure 1 will be adhered to throughout the subsequent discussion.

(Continued on next page)

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Valve Failures

For the purpose of this discussion, the types of valve failures encountered in service may be classed as breakage and burning. The common causes for these failures are as follows:

Causes of Breakage

1. Unsuitable valve material.
2. Unsuitable valve type—to cure, consider
 - a. Two-piece type.
 - b. Sodium-cooled stem or head.
 - c. Stellite-faced.
 - d. Copper-cooled stem.
 - e. Oversized stems.
3. Defective material or manufacture (forging cracks, slag or oxide inclusions).
4. Excessive valve temperatures—usual causes:
 - a. Lean mixture ratios.
 - b. Valve head extending too far into combustion chamber.
 - c. Poor seat condition, blow-by at spots on seat.
 - d. Poor stem condition.
 - e. Poor guide condition.
 - f. Insufficient tappet clearance.
 - g. Excessive spring tension.
 - h. Incorrect valve timing.
 - i. Incorrect ignition timing.
 - j. Full-throttle operation.
 - k. Excessive detonation.
 - l. Excessive exhaust back-pressure.
 - m. Poor port, block, water-passage, and guide-boss design.
5. Valve-seat distortion.
6. Floating of valve assembly—usual causes:
 - a. Weak springs.
 - b. Over-strong springs.
 - c. Operating engine in critical speed range.
 - d. Excessive tappet clearance causing improper cam action.
 - e. Valve-spring surge.
7. Cocked valve springs or retainers.
8. Scratches on stem from improper cleaning methods.
9. Normal fatigue (limit of useful life).
10. Seat eccentric to stem.
11. No interference angle on seat.

Causes of Burning

1. Unsuitable valve material.
2. Unsuitable valve and engine design.
3. Excessive valve temperatures (same as under breakage).
4. Full-throttle operation (i. e. overloaded engines).
5. Part-throttle operation (i. e. lean mixtures).
6. Valve-stem stretching—usual causes:
 - a. Excessive temperature.
 - b. Incorrect material.
 - c. Over-strong springs.
7. Valve-seat distortion—usual causes:
 - a. Mechanical distortion during installation or re-tightening heads (substitution of solid copper for copper-asbestos gasket often helpful).
 - b. Insufficient or unequal cooling (jacket deposits, defective cylinder casting).
 - c. Differential expansion (consider use of interference angle with prevention of valve rotation).
8. Warpage of valve head.
9. Warpage of valve stem.
10. Forging of valve seating surface—usual causes:
 - a. Unsuitable stem material.
 - b. Lacquer deposits.
 - c. Insufficient clearance between stem and guide.
11. Insufficient tappet clearance—heavy-duty full-throttle service may require up to 50 per cent more clearance.
12. Valve head and seat materials not compatible ("warts" or "pick-up").
13. Too infrequent service checks.
14. General maintenance.

It is quite evident that the causes for these two types of failures are considerably overlapping and interrelated, and that the occurrence of either one may be the cause of the other. In the following discussion, we will cover some of the more pertinent causes of failures, showing examples, and will try to describe some effective methods of eliminating or reducing these failures.

The first two items, valve material and design, are problems which obviously must be handled by the valve and engine manufacturers and therefore will not be discussed further in this article. Since the material and design of the valve itself are very closely related to these same items in the engine, the cooperation of the valve and engine manufacturers is essential to assure good performance.

Valve Temperature

Temperature is perhaps the most important single factor associated with valve life. It is more closely and directly related to either type of valve failure than any of the other factors, most of which tend to change valve temperature and thus indirectly influence failures. This is quite evident from the fact that failure of intake valves, which usually operate at appreciably lower temperatures than exhaust valves, are relatively minor compared to exhaust-valve failures.

The design of the valve itself and the design of some of the valve gear—such as guide boss, port passages, and water passages in the head and block—has an effect on valve temperature. In addition, certain operating conditions affect valve temperature appreciably—for instance, the fuel-air ratio. Valve operating temperatures are dependent upon fuel-air ratio; they reach a peak at approximately the theoretical chemically correct mixture, and decrease for both leaner and richer mixtures. Since most operation is at the most economical

mixture—which is just slightly richer than the theoretical value—the valves are generally operating at peak temperatures from the standpoint of fuel-air ratio, providing other conditions remain unchanged.

Valve operating temperature also increases with increased engine speed and load, the former having the more influence. Some of the other factors which are associated with valve temperature will be discussed separately later in this article.

Valve Head

A fairly heavy head on the valve is necessary to give it enough strength and heat dissipation. However, too much of the valve should not extend into the combustion chamber, for this may result in overheating. When the valve has been faced down so that a knife edge results on either part or all of its circumference, its weakened condition may lead to breakage and burning; it may also cause pre-ignition due to localized heating on the edge.

This may result in cupping of the valve. Accordingly, when refacing brings the margin below 3/64 inch, it is generally the best practice to replace the valve with a new one.

Valve Face and Seat

The valve face and seat are perhaps the most critical parts, for it is there that the seal between the valve and block or head must be made to prevent the flow of gases.

The correct width for valve seats varies with the size of valve and the condition under which it operates; therefore it is difficult to set up a standard specification for width. However, it is generally good practice to maintain the seat width specified by the engine manufacturer. Seat widths in the range of 5/64 to 9/64 inch are recommended for many engines. Too wide a seat tends to collect and allow accumulation of carbon and other hard particles of deposits; while too narrow seats reduce the rate of heat dissipation into the jacket coolant, which may result in

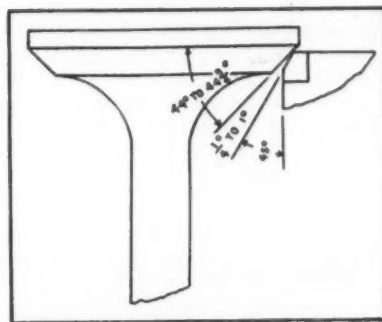


Figure 2. Exaggerated illustration of interference angle.

overheated valves.

In some cases where valve burning is difficult to overcome, it has been found very satisfactory to use an interference angle of 1/4 to 1 degree; that is, the valve is faced at an angle 1/4 to 1 degree flatter than the seat angle as illustrated in Figure 2. This exerts greater pressure on the upper edge of the valve face and tends to give a

(Continued on next page)

... with the same dragline when equipped with a Page **AUTOMATIC**

On an actual 16 consecutive day run with all conditions alike—the same dragline, the same operators and the same material, a 25 cu. yd. Page AUTOMATIC Dragline Bucket outperformed a competitive bucket of the same rated size by a wide margin. The table gives all the facts found by a well-known coal company which made the test to determine the best bucket for their own stripping operations.

Assuming that both buckets carried equal loads, the Page AUTOMATIC made 11.5% more swings per hour. Considering both the increased number of swings and larger loads, the Page AUTOMATIC moved 25.9% more material than the competing bucket.

The extra bucket loads were obtained by the AUTOMATIC because of its quick loading features. Generally, little more than two lengths of the bucket are required to pick up a full load.

Rated capacity cu. yds.	No. of 24-hour days in use	No. of bucket loads in period worked	User's Engr's estimate of cu. yds. per bucket load	Total cu. yds. excavated in period worked	Cu. yds. excavated in 24-hour day	Average number of bucket loads per hour
25 Cu. Yd. Competing Bucket	15 consecutive days	19,685*	20.2	397,637	26,509	54.68
25 Cu. Yd. Page Automatic	16 consecutive days	23,424*	22.8	534,067	33,373	61.0

*Recorded by Esterline-Angus

The increased yardage moved with the AUTOMATIC was due to its ability to obtain full loads on every trip while the competing bucket did not load the back end once out of ten times.

No effort was made during the test to determine the amount of dragline pull necessary to operate either bucket. However, other installations have proved that a Page AUTOMATIC requires up to 25% less dragline pull than the usual old style bucket.

Whether you need a small bucket or a big one, you can always move more yardage at less cost with a Page AUTOMATIC.

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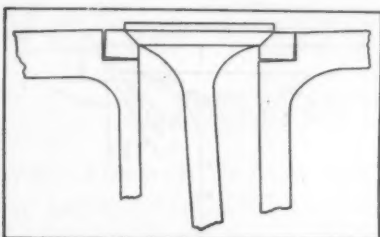


Figure 3. Exaggerated illustration of warped valve and seat distortion.

Valve Care Affects Engine Performance

(Continued from preceding page)

better seal.

When the material in the valve face and the seat are not compatible, a phenomenon occurs which has been described by such terms as "pick-up", "warts", or "block pounding". What happens in such cases is that the structure of the seat material changes under certain extremely high temperatures, and softening results. When the valve comes in contact with the softened seat surface, little balls of iron are rolled up from the seat and stick to the valve. This can generally be overcome by the use of hard valve-seat inserts.

When severe seat wear occurs, particularly on intake valves, it is generally an indication that the air cleaner is not performing satisfactorily. Seat pitting occurs when hard particles have come between the seat and valve face and are pounded into the seats which may become softened somewhat due to the high temperature. It is very difficult to prevent this except by the use of Stellite seats, but it can be corrected by refacing.

Both hot and cold valve-seat distortion are encountered in service. Cold distortion generally results from improper or uneven tightening of the cylinder-head bolts. Hot distortion, as the term implies, results from overheating during operation. Either of these types of distortion may result in warped valve stems and poor seating of the valve, as illustrated in Figure 3.

Valve Stems

The main difficulties associated with the valve stem are stretching and distortion. Both these are generally attributable to high temperature, which may result from any one or a combination of the items already discussed under valve temperature; or in some cases they are attributed to poor valve material or design. Either stretching or distortion of the stem may result in poor seating due to lack of concentricity between the valve and seat. The concentricity of the valve face to stem should generally be kept at a minimum and within 0.003-inch total run-out.

Valve Guides

The primary function of the valve guide is to maintain perfect alignment between the valve face and seat so as to form a perfect seal. In order to

accomplish this function, proper stem-to-guide clearances must be maintained. Too large clearances will cause a valve to "wallow out" the seat, while too little clearance will result in valve sticking at high temperatures. The stem-to-guide clearance generally increases with the stem diameter and may vary with different types of engines. However, a safe general rule to follow for exhaust valves with alloy-steel stems is to allow 0.001-inch clearance per $\frac{1}{8}$ -inch stem diameter, while intake valves should operate with a clearance of 0.001 inch per each $\frac{3}{16}$ -inch stem diameter. The generally recommended average clearances for various-size valves are as follows:

Valve Stem-to-Guide Average Clearance (in Inches)		
Nominal Diameter	Inlet	Exhaust
5/16	0.0015-0.0035	0.0015-0.0035
11/32	0.0015-0.0035	0.0015-0.004
3/8	0.0015-0.0035	0.002-0.004
7/16	0.002-0.004	0.003-0.005
1/2	0.0025-0.0045	0.004-0.006
5/8	0.003-0.005	0.005-0.007
3/4	0.004-0.006	0.006-0.008
7/8	0.0045-0.0065	0.007-0.009
1	0.005-0.007	0.008-0.010
1 1/8	0.0055-0.0075	0.009-0.011
1 1/4	0.006-0.008	0.010-0.012
1 1/2	0.007-0.009	0.011-0.013
1 5/8	0.0075-0.0095	0.012-0.014

In addition to proper stem-to-guide clearance, it is also essential for the guide to be concentric with the seat. The concentricity between the seat and guide should be within plus or minus 0.001 inch and may be attained by proper grinding of the seat. Valve stems should also be smooth to avoid excessive wear of the guide with resultant increased clearances and bell mouthing. Some difficulty due to corrosion may also be encountered in certain bronze exhaust-valve guides. This may generally be minimized by reducing the operating temperature of the valve guide.

Bell mouthing of the guides due to wear is generally caused by expansion of and warping or distortion of the valve stem, guide, or seat. (See Figure 4.) Since the guide expands at high temperature, the pocket or bell mouth will open so that deposits can collect in it. Then, on cooling and contraction, the valve stem will become pinched and result in sticking valves and subsequent burning.

Tappet Clearances

Maintaining correct valve-tappet clearances is considered by some as the most important maintenance item. If the clearances are too small, the valve

will not close properly when hot; this will permit blow-by of hot gases with resultant burning. If the clearance is too great, it will tend to upset the timing. It will shorten valve lift above the seat, preventing maximum intake and exhaust, and the ramp portion of the cam will be inoperative, causing the

valve to be lifted and seated with terrific impact with resultant excessive loads and eventual breakage. Proper clearances vary with different engines and it is therefore advisable to adhere closely to the engine-manufacturer's recommendation.

(Continued on next page)

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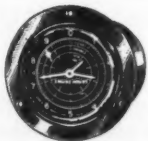
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Valve Springs

The function of the valve spring is to hold the valve face tightly against the seat until forced open by the cam or tappet. In order to do this the spring must have the correct tension. If a spring is too weak, the valve will flutter and be thrown from the cam, and will not follow it at higher speeds. This will cause excessive bounce and impact with resultant failure. A spring which is too strong will cause valve stretching with resultant over-heating and eventual burning and failure. It is advisable to check the spring tension at its operating length whenever valves are serviced. If springs are only slightly weak, this can sometimes be corrected by placing a thin shim (1/16-inch) between the springs and the seat in the block or head. In fact, some operators have found it very satisfactory to shim the spring in this manner whenever they are refacing valves, to compensate for the lengthening of the valve stem due to removal of metal from the valve face and seat.

In addition to having proper tension, the valve springs must have smooth, even, square ends. When valves are installed they must also be checked to ascertain that the spring or retainer is not in a cocked position. Either of the foregoing may result in side thrust on the valve stem which will cause distortion, uneven wear of the stem and guide, and poor seating, with resultant blow-by and failure.

Valve Timing

An intake valve opening too early will allow the intake mixture to become contaminated with exhaust gases, while an exhaust valve opening too early will not allow complete expansion and cooling of combustion gases on the power stroke. Late opening of the intake valve reduces the quantity of intake mixture entering the cylinder, while late opening of the exhaust valve does not permit complete discharge of exhaust gases and results in reduced compression pressure. All of these factors reduce power and efficiency. They also increase valve temperature and thus reduce valve life.

Ignition Timing

Ignition and valve timing must be closely coordinated and must occur at the proper point in the cycle to give maximum power and best performance.

With early ignition, maximum pressure occurs too early in the cycle and results in loss of power. With too late ignition, maximum pressure is not reached early enough to overcome the increased volume caused by the receding piston; this results in loss of power. The latter condition can be much more injurious

to exhaust-valve parts than the former, since the burning gases pass through the valve opening before sufficiently cooled due to expansion. Incorrect ignition timing may also result in detonation and pre-ignition, which have an appreciable effect on valve temperature and life.

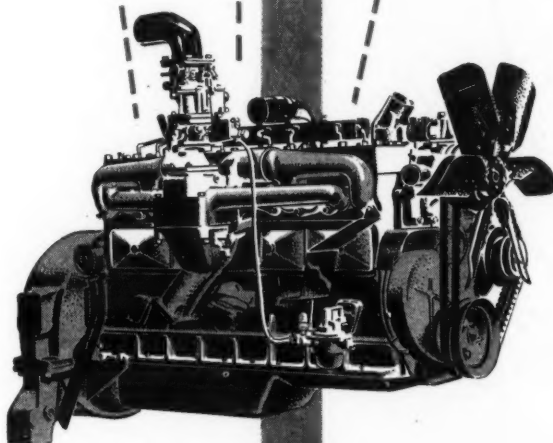
Carburetion

Improper carburetion will not only reduce power and efficiency, but will also affect valve life. As pointed out earlier, fuel-air ratio affects valve temperature and thus valve life. In addition, rich mixtures will foul spark plugs, (Continued on next page)



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Valve Care Affects Engine Performance

(Continued from preceding page)

waste fuel, form excessive deposits, dilute lubricants, and cause roughness at low speed.

Intake-Valve Deposits

Excessive deposits on any part of the valve or stem may prevent proper seating which results in blow-by, excessive temperature, and resultant burning and valve failure. Deposits are more or less indirect causes of failure, since they are generally a result of some other factor or combination of factors. Deposits may vary in nature from a soft gummy carbon to a hard carbon and lava-like substance, depending upon the condition responsible for their formation. In many instances their nature aids considerably when it comes to diagnosing their cause.

Excessive gum in gasoline may produce heavy gummy deposits on the

upper portion of the intake-valve stem and fillet under certain types of operation, particularly in winter or under "stop-and-go" driving conditions. When fuels leave the refinery, the gum content must be below a certain specified safe limit. However, storing certain fuels for a long time may increase their gum content. The rate of formation of gum in fuels during storage is greatly accelerated by certain catalysts such as copper in the fuel line and tanks and soldering fluxes which may be present in a new tank.

Improper carburetion resulting in poor combustion and repeated back-firing as well as worn guides, poor seating, and excessive leakage past the valves may also contribute to deposit formation. In addition, unstable oil, too little oil, or too much oil resulting from excess carry-over from the oil-bath air cleaner, may affect valve deposits. Introduction of dirt and foreign matter through the air intake, due to a dirty or otherwise improperly functioning air cleaner, or no air cleaner at all, will

also increase deposit formation.

Using oil which is very unstable, or allowing too long a period to elapse between oil drains, also may tend to aggravate deposit formation. This may be particularly true under low engine operating temperatures.

Exhaust-Valve Deposits

Exhaust-valve deposits are greatly aggravated by poor condition of the valve guide. Worn and sloppy guides allow oil to fill in the space between the stem and the guide, and to stew there and become cooked into a hard mass of carbon which eventually holds the valve off the seat. Guides extending too far into the ports allow the stem to become heated excessively and thus aggravate the formation of deposits. This condition can be minimized by cutting the valve guide back square and sharp so that it does not extend into the valve port too far. Valve-guide material which is too soft may also be an indirect factor since it allows excessive wear.



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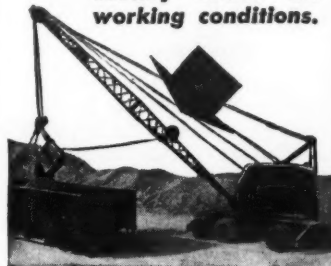
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Valve-Maintenance Practices

The importance of good valve-maintenance practices cannot be over-
(Continued on next page)

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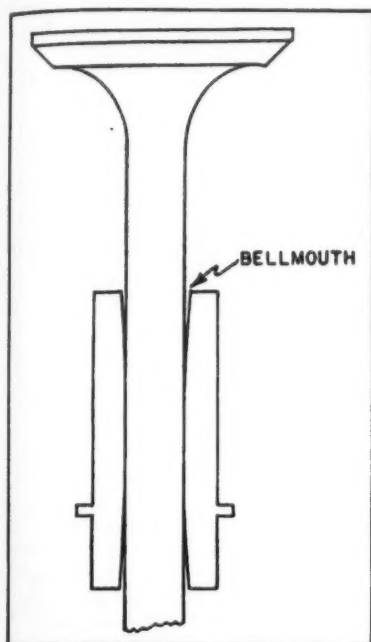


Figure 4. Exaggerated illustration of "bell mounding" of valve guide.

emphasized, for, regardless of how perfect the design and materials, if the valve is not installed or adjusted properly, failure will result. Some of the items which rightly belong in the category of maintenance have already been discussed, but will again be pointed out and emphasized here.

Servicing: Periodic checks are one of the first essentials for proper valve functioning and maximum valve life. Service checks of valve-tappet clearances and compression pressures, which are readily made, will generally indicate if further and more extensive servicing is required.

After valves have been in operation for some time and are removed for servicing, they should be checked for wear on the stem, straightness of the stem, valve face and seat condition. If necessary, they should be refaced.

In addition, it is desirable to make periodic checks on the carburetion system and valve and ignition timing. As previously pointed out, ignition and valve timing must be closely coordinated; for this the use of a timing light is essential.

Refacing: Refacing the valve and seat is one of the most important operations in proper valve maintenance and perhaps requires the greatest skill. Refacing may be performed in an engine lathe equipped with a tool post grinder, or on one of the various types or makes of valve refacers. In every case it is essential that the refacing equipment be operated and maintained properly and in accordance with instructions generally supplied with it. For instance, the use of a dull or loaded grinding wheel for refacing a valve may result in "grinding checks", or numerous hair-line cracks, on the valve face, which will eventually lead to valve burning and failure. These cracks apparently result from intense local heating and subsequent cooling at the region of contact between the wheel and valve face, especially with a dull or loaded wheel. They are so fine as to be invisible to the naked eye; however, they are quite evident under magnification.

These cracks serve as the foci for stress concentrations and can be produced by refacing operations not sufficiently severe to blue the valve face. This condition, plus cycling and uneven high-temperature operations, pounding, and deposit formation, apparently starts the burning action along the cracks. Eventually it develops into guttering and further cracking followed by complete burning and breaking away of sections of the valve head.

Normally, in refacing valves, the angle of the valve face should exactly match the seat angle. However, when guttering (washing out a trench across the valve face) is occurring during

operation, the use of an interference angle previously discussed has been found helpful. In addition, valves should be checked during refacing for concentricity of the valve face to stem, which should be held within 0.003-inch total run-out.

Grinding: In some instances it may be necessary to lap or grind the valve face and seat with grinding compound. However, it is advisable to keep away from this practice if possible, particularly with alloy steels of the high-heat-resisting type, which have a greater coefficient of expansion than the low alloys or cast iron, and consequently will not seat in the same position when hot as when cold. Therefore, after a groove is ground into the valve face due to the abrasive action of the grinding compound, the valve will probably ride on the resulting ridge with poor seating when operating at normal temperatures.

In case it is necessary for the valve to be lapped with a grinding compound, it is advisable to rotate the valve against the seat with minimum pressure.

(Continued on next page)

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See also page 18

Valve Care Affects Engine Performance

(Continued from preceding page)

sure (no more than the weight of the valve) by means of a tap wrench or lathe dog fastened to the stem at the end opposite the head. This will assure the same alignment with the guide as when in normal operation. Used grinding compound should be removed frequently and fresh compound applied.

Valve Seats: The use of removable valve-seat inserts has become general practice by many engine manufacturers in the past few years. Since the major part of the heat from a valve is transferred through the seat, and any air spaces between the seat insert and head or block will greatly reduce the heat transfer, it is essential that they be installed correctly. In an effort to maintain maximum heat transfer, some manufacturers furnish seat inserts with a smoothly ground finish on the outside surface.

Since the details of installation of the various makes of seat inserts differ, it is generally the best practice to follow the instructions supplied by the manufacturer as to removal, installation, and press-fit allowances.

After the seat insert is installed it should be ground to the proper seat angle so that its concentricity with the guide will be within the required limits, as determined by the dial test indicator generally furnished with grinding equipment for this purpose. In this connection, it may also be found helpful to use a dummy head or block, depending on the type of engine, which can be drawn down so as to set up any strain which will be present when the head is actually installed.

In regrinding seats which have been in service for some time, it may be necessary at times to remove enough metal to bring the seat into concentricity with the guide so that it will become wider than the valve face itself. When this occurs, the seat should be narrowed down by the use of a grinding wheel with an angle approximately 15 degrees flatter than the seat angle; it should be narrowed enough so that the upper seat diameter is at least 1/16 inch less than the upper valve-face diameter.

Valve Guide: As in the case of removable seat inserts, most present-day engines are equipped with removable valve guides. In general, it is good practice to check worn guides at regular intervals and replace those which have been worn so that the clearances are

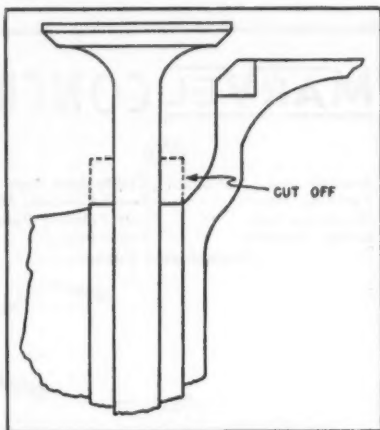


Figure 5. Illustration showing cut-off guide.

more than twice those specified for new parts.

The first step in replacing a valve guide should be to check the guide bore in the cylinder block, head, or cage to determine if it is worn appreci-

ably and if the guide has the correct interference or press fit. The guides should have a good press fit, but not so great as to cause breakage of the guide or to distort the valve bore itself, which would result in valve sticking. A safe general rule to follow is to allow 0.001-inch press fit per inch of guide diameter. Generally it is desirable to extend the guide well up to the valve head; however, it should not be allowed to protrude appreciably beyond the guide bore, since it will become overheated, with resultant distortion, bell mouthing, and poor valve operation.

After the guide has been installed it should be reamed with a suitable reamer to the exact inside diameter to assure the correct valve guide-to-stem clearance.

In some cases, where the guides extend beyond the guide bore and poor performance results due to guide distortion and deposit formation, it has been found very helpful to cut the guide off flush with the bore, as illustrated in Figure 5.

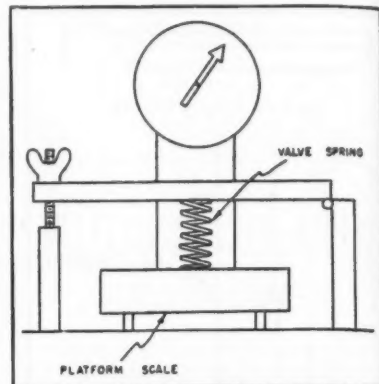


Figure 6. Simple device for determining valve-spring compression pressures.

Valve Springs: The effect on valve life of too weak, too strong, or otherwise defective springs has been previously discussed. The importance of checking springs at the time of each valve servicing should, however, again be emphasized. Valve spring testers for

(Concluded on next page)

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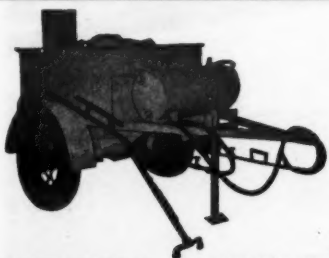
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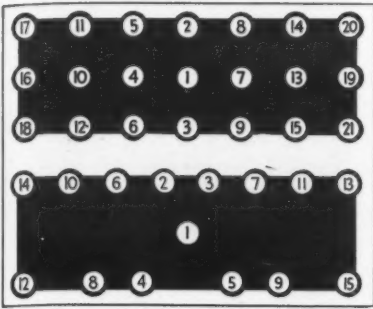


Figure 7. Diagram showing typical sequence for tightening down cylinder-head bolts.

determining spring compression pressures are available commercially. However, if a regular tester is not available, a small platform scale may be set up under a drill press or a lever hinged at one end, as illustrated in Figure 6. This can be used to determine the pressure required to compress the spring to the length it would have when installed and when the valve is in either a fully open or closed position. Although the exact compression pressures for all springs are not given here, they are available from engine or spring manufacturers. When these are not available, a safe rule to follow is to check all new springs before installation and not use any springs that deviate from the average by more than 10 per cent. Similarly, any old springs showing variations of more than 10 per cent from the average value of the new should be replaced.

Cylinder-Head Tightening: Proper tightening down of the cylinder head during valve servicing can make the difference between a satisfactory or unsatisfactory job. For, as previously pointed out, distortion of the valve seat can result if the cylinder head and gasket are not correctly installed or if the head is not tightened down.

Most engine manufacturers have their own recommended procedure so that it would be impossible to cover them adequately in this article. However, there is one thing all these procedures have in common: that the cylinder-head bolts should be drawn down evenly and in a definite order or sequence. This should be done gradually, first making all bolts finger-tight, then tightening lightly with a wrench, then drawing down snugly, preferably with a torque wrench to a given torque setting. This should be repeated after the engine has been warmed up to normal running temperature. Figure 7 illustrates typical recommended sequences of tightening cylinder-head bolts for a head with two and also three rows of bolts.

From an article by E. F. Koenig, Beacon Laboratories, The Texas Company, in the July, 1948, issue of *Lubrication*, published by The Texas Company.

Film on New Earth-Movers

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This sound film covers the complete line of Euclid off-the-highway equipment and its use on highway, airport, dam, levee, and other large construction projects. It shows Euclid bottom-dump, rear-dump, and side-dump hauling units, as well as the Euclid loader.

Signs Made in Many Styles

A catalog on the complete line of Fireball signs and reflector buttons is now available from The Grote Mfg. Co., Inc., Bellevue, Ky., formerly The National Color-type Co., Inc. These signs are made in both reflector and standard models. They include stop signs; speed-

regulation signs; parking signs; school, railroad, and other caution signs; highway curve, junction, passing, and other movement-control signs; destination and city-limit signs; street signs; and many others.

The 32-page catalog pictures samples of several of these signs, and lists the sizes and styles in which they are made. It also describes the development of the aspheric design of the Fireball reflective lenses, their construction, and steps in the manufacture of Grote signs—including painting and finishing.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 6.

Walker Joins Motorola, Inc.

Frank W. Walker, of Battle Creek, Mich., has been appointed Radio Communication Engineer in the State of Michigan by Motorola, Inc. Mr. Walker has served as a radio engineer for the Greyhound Corp. and the Michigan State Police Department.

Dragline and Dipper Buckets

for every digging job

More payloads per pass because no excess weight. Wearing parts made of manganese steel, need not be cast excessively heavy to allow for wear.

Dragline Buckets

Four work-producing types:

Medium— $\frac{1}{2}$ to 20 yards.
Stripping—1 to 18 yards.
Standard— $\frac{1}{2}$ to 18 yards.
Heavy Duty— $\frac{1}{4}$ to 14 yards.

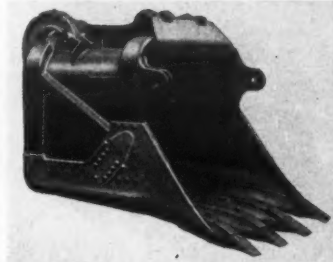
Dipper Buckets

Two types:

Cast-welded—for general purpose work.
 $\frac{1}{2}$ to $6\frac{1}{2}$ yards.
All cast—Rock-type bucket for extremely severe service. $\frac{1}{2}$ to 5 yards.

For descriptive literature, see your nearest ESCO representative or write Electric Steel Foundry, 2169 N.W. 25th Ave., Portland 10, Oregon; 720 Porter Street, Danville, Illinois. Offices in Eugene, Oregon; Chicago; Honolulu; Houston; Los Angeles; New York; San Francisco; Seattle; Spokane; Vancouver, B.C.

ESCO DRAGLINE AND DIPPER BUCKETS



When there's nothing more to say...
SEE YOUR "QUICK-WAY" DISTRIBUTOR

*Reg. U. S. Pat. Off.

MORE WORK PER DAY

Perfect balance and all steel construction for strength and lightness permit "QUICK-WAYS" to operate faster with greater loads. Any location accessible to a truck is accessible to a Truck Mounted "QUICK-WAY"

MORE USES PER MACHINE

Eight interchangeable attachments make "QUICK-WAYS" convertible on the job in minutes from Shovel to Clamshell, Crane, Dragline, Pile Driver, Scoop, Trench-Hoe or Backfiller.

MORE YEARS OF SERVICE

Many of the earliest "QUICK-WAYS" made are still profitably active—some nearly twenty years old. "QUICK-WAYS" are built to last against the toughest odds with minimum attention and expense.

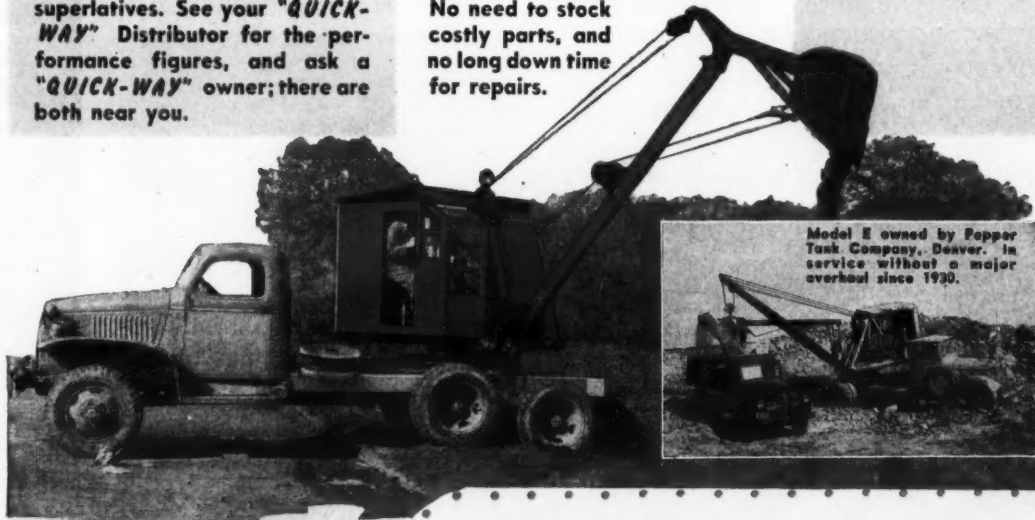
MORE PROFIT

It's all in the "QUICK-WAY" record of performance. In the final analysis that's the only thing that counts. You can't cash superlatives. See your "QUICK-WAY" Distributor for the performance figures, and ask a "QUICK-WAY" owner; there are both near you.

MORE ECONOMY

The simplest possible construction with many interchangeable parts makes for fast servicing and easy low-cost maintenance. No need to stock costly parts, and no long down time for repairs.

Service available from Distributors strategically located throughout the U. S. and worldwide.



Model E owned by Pepper Tank Company, Denver. In service without a major overhaul since 1930.

For speed, portability, economy of operation, and adaptability to a wider range of jobs, nothing of comparable size equals a "Quick-Way" Truck Shovel.

"QUICK-WAY" TRUCK SHOVEL CO.
DENVER, COLORADO



Model E: 4/10 cu. yd. cap., mount on any standard 5-ton truck.
Model J: 1/4 cu. yd. cap., mount on any standard 1 1/2-ton truck.



FIRST SECTION.

The Penn-Lincoln Parkway in Pennsylvania will tie together the William Penn Highway (U.S. 22) and the Lincoln Highway (U.S. 30) east of Pittsburgh, and will continue traffic west over 9 miles of expressway route, through Squirrel Hill Tunnel, into the Golden Triangle in downtown Pittsburgh, and across the Monongahela River. About 10 per cent of the first section of the \$100,000,000 project was opened to limited inbound traffic during July of this past summer.



PAVEMENT.

Johnson, Drake & Piper, Inc., of New York is building the pavement, at a cost of \$2,042,368, including an interchange at the William Penn Highway (U.S. 22) and the Lincoln Highway (U.S. 30) east of Pittsburgh. The pavement will be 12-foot lanes with a 4-foot-wide raised median strip and 10-foot shoulders. The concrete will be 10-inch reinforced concrete.

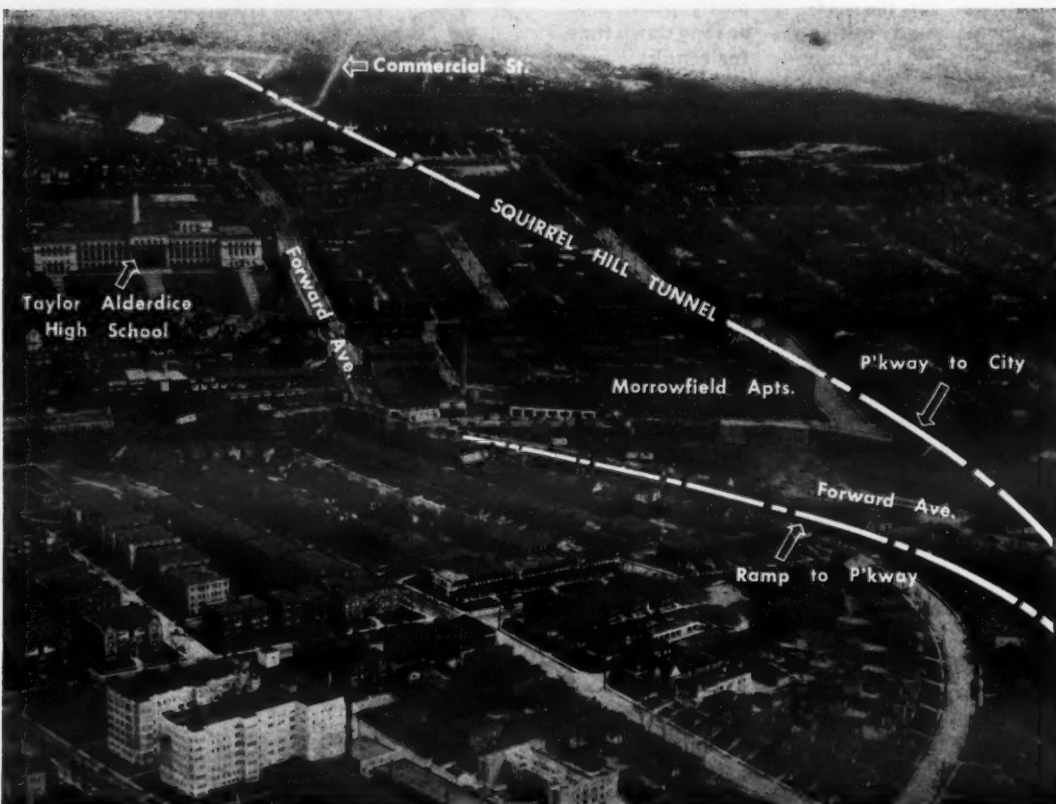


UNDERPASS.

Main-line tracks of the Pennsylvania Railroad cross the Parkway at Edgewood Avenue, where John F. Casey Co. of Pittsburgh is building a \$1,165,000 underpass. The structure will require 11 parallel spans, each constructed independently of the adjacent one. And during construction, uninterrupted traffic, proceeding at normal speed, has to be maintained at all times on two eastbound and two westbound tracks.

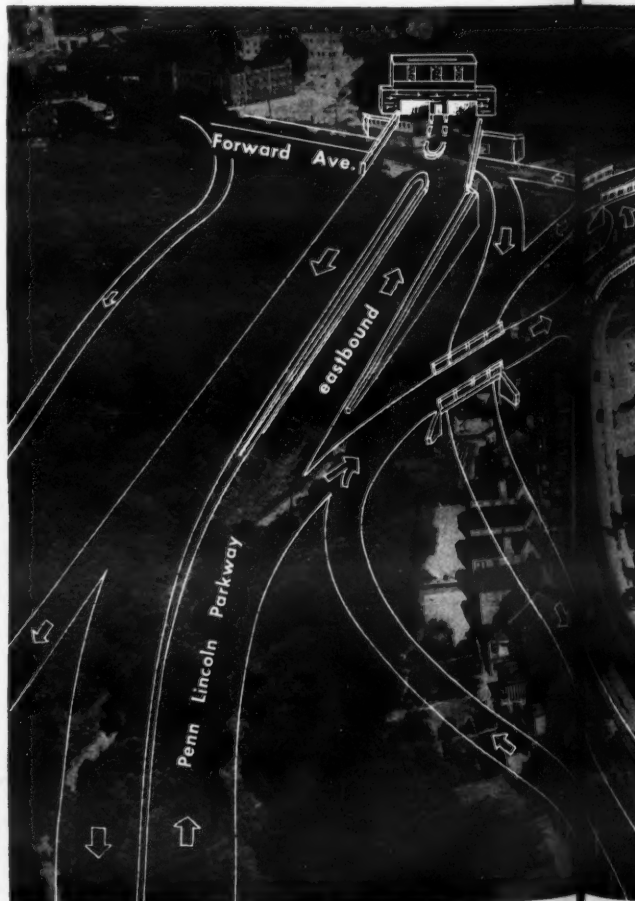
Penn-Lincoln Parkway

Contracts Under Way \$9-Mil.
Which Will Carry Traffic Into
The Golden Triangle in Downtown



TUNNEL ROUTE.

Before the Parkway enters downtown Pittsburgh, it will travel for 4,225 feet under Squirrel Hill in a twin-tube tunnel built on a 2½ per cent grade. The tunnel will stretch from near Commercial Avenue at the east, to the interchange near Forward Avenue on the west. B. Perini & Sons, Inc., of Framingham, Mass., has the \$13,767,843 contract. Dinardo, Inc., holds a \$1,778,354 contract for a reinforced-concrete arch bridge over Commercial Avenue and Biddle Street at the east tunnel entrance.



TUNNEL DESIGN.

Each tunnel tube, 29½ feet wide, will be paved with a 10-inch concrete base and a 1½-inch vitrified-brick driving surface. Tunnel walls of reinforced concrete will be 10 feet high. Portal buildings (the one at the west or Forward Avenue end of the tunnel and the one at the east or Commercial Avenue end) will be 86½ feet high and will house ventilation equipment.



Inc., of West is building the first section at the eastern end for interchange with the William Penn Highway. (See C. & E. M., Feb., 1948, p. 76.) The Squirrel Tunnel where it branches into six lanes, it has four strip and 10-foot shoulders. A 6-inch subgrade supports the reinforced concrete paving.



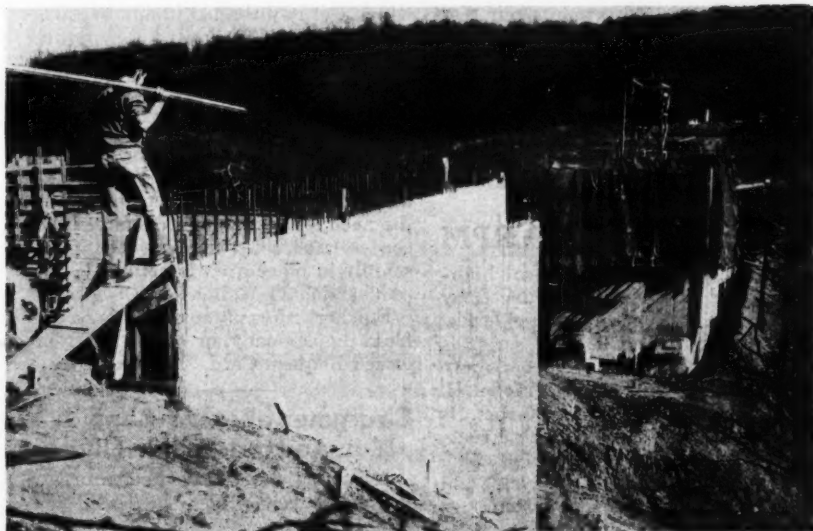
INTERCHANGE. A second interchange at the eastern end of the Parkway is being handled by Dinardo, Inc., of Pittsburgh for \$1,005,178. (See C. & E. M., Feb., 1948, pg. 76.) Six structures comprise the cloverleaf which links the Parkway with the Lincoln Highway—or Ardmore Boulevard, as it is called at this point—a main artery to and from the western end of the Pennsylvania Turnpike. Ardmore, as shown here, is the thoroughfare with tracks; the Parkway is carried over it by the overpass in the center.

Lincoln in Progress

Way 9-Mile Expressway
Traffic Into and Through
the downtown Pittsburgh



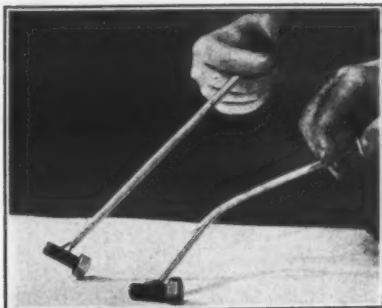
wide 100-foot center to center, will carry two 12-foot lanes of concrete on a 1-inch subgrade, a 3/4-inch mastic cushion, and a 1 1/2 to 1 3/4 feet thick, covered with glazed tile. A drainage channel appears in the sketch superimposed on this picture, all home ventilation machinery and maintenance facilities.



OVERPASS. Another of the deck-type structures on the Parkway is this Maple Avenue overpass which Sanctis, Inc., of Pittsburgh is building. All in all, the Parkway design calls for 34 bridges including 6 interchanges—the two interchanges with the William Penn and Lincoln Highways at the eastern end, one at Braddock Avenue, one at Forward Avenue in the Squirrel Hill area, one at Bates Street, and a complicated one in downtown Pittsburgh.



GOLDEN TRIANGLE. It will be several years before the Parkway reaches down this far, paralleling Second Avenue, to the new bridge on which it will cross the Monongahela River. And E. L. Schmidt, Chief Engineer for the Pennsylvania Department of Highways, estimates that it will be 10 years at least before a \$60,000,000 Penn-Lincoln Parkway West stretches 14 miles to its western terminus at Clinton, Pa. But he envisions also an extension from Clinton to the Ohio state line, and the day when motorists can travel east all across Pennsylvania on expressways, via the Parkway, Routes 22 and 30, the Turnpike and its eastern extension, to Philadelphia.



The Flex-O-Pic's flexible shaft and retracting or expanding fingers enable it to reach into out-of-the-way places or around corners and grab a tight hold.

Tool Reaches, Grabs In Out-of-Way Spots

A flexible-shaft tool designed for picking up small objects in inaccessible places is announced by Emco Enterprises, Dept. 31, 6750 Stony Island Ave., Chicago 49, Ill. A feature claimed for the Flex-O-Pic is its retracting and expanding fingers which enable it to get a tight hold on a desired object while reaching into confined or restricted places.

The shaft of the tool is made from a flexible cable which is encased in a flexible housing. The grasping fingers are controlled by thumb pressure on a button at the head of the tool. The Flex-O-Pic is furnished with various-sized shafts to meet specific purposes. The manufacturer also points out that the tool is precision-manufactured, cadmium-plated, and acidproof.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 42.

Diesel Engine Rated 165-Hp at 1800 RPM

A new addition to its line of high-speed diesel engines is announced by Cummins Engine Co., Inc., Diesel Drive, Columbus, Ind. The HR-600 series is designed to develop 10 per cent more horsepower than the present Model H, or 165 hp (maximum) at 1,800 rpm. It has a 5 1/8-inch bore and 6-inch stroke, and a piston displacement of 743 cubic inches. It has a 4-stroke cycle and features the Cummins fuel system.

The HR-600 is available in the HRB-600 automotive model; the HRBI-600, HRI-600, and HRP-600 industrial models; and the HRM-600 marine model. The Model HRBI-600 is the basic industrial model; the HRI-600 is equipped with an instrument panel and trunnion support base; and the HRP-600 is an enclosed power unit with structural-steel base, clutch power take-off, radiator, fan, engine hood, and fuel tank. According to the manufacturer, field conversion from the H to HR series can be made by re-boring the present block and installing new pistons and liners. Installation of the new increased-flow lubricating system and continuous-groove bearings is optional.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 102.

Altimeters for Surveying

A 4-page folder on low-range surveying altimeters is being distributed by Wallace & Tiernan Products, Inc., 1 Main St., Belleville 9, N. J. The W. & T. precision altimeter, Type FA-176, has a range of 2,000 feet and is designed to give accurate readings to the nearest foot.

The folder discusses altimeters and their use in vertical-control surveys. It explains matched-set calibration, and points out its advantages in the two-base method of precise altimetry. It describes the design of the FA-176 altimeter, its construction, operation, advantages, and recommended applica-

tions. And it contains a list of specifications covering range, graduations, calibration, scale length, dial diameter, sensitivity, accuracy, temperature effect, weight, and other information.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 80.

Directional Lights For Airport Runways

A bi-directional high-intensity runway light for airports has been announced by the Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa. The Type BHI runway light is said to exceed the requirements of CAA Specification L-819 and Army Air Force Specification No. 32957. It can be installed as direct replacement of old-style high-intensity lights or can replace semi-flush contact lights, since it will mount on the same base as earlier units, the manufacturer explains.

The two main beams are formed from a single lamp by duplicate double-lens assemblies. Color is provided by a colored inner lens. Through the use of prismatic panels on the sides, this lamp will also provide a uniform and controlled fill-in light both across and away from the runway itself. The Westinghouse runway light uses a 200-watt 6.6-amp aviation lamp Model No. 6.6 A/T 14P with medium prefocus base. Special low-loss transformers are available which can be installed in any Westinghouse-type AN base or AN-type deep base.

The housing is made of one-piece cast-silicon aluminum. The base plate is of cast semi-steel and is designed to carry a 100,000-pound loading. The top assembly lifts off for re-lamping and is indexed to permit replacement without the need for realigning the lamp. Over-center latches for holding the top assembly in place are of anodized aluminum and have stainless-steel springs.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 21.

Equipment-Repair Shop Is Mounted on Truck Chassis

A catalog describing the features of its mobile repair shop has been prepared by Couse Mfg., Inc., 300 Passaic St., Newark 4, N. J. The Type M shop is mounted on a standard truck chassis and, according to the manufacturer,

provides ample equipment for doing heavy-duty repairs right on the job.

Several photographs in the catalog show how precision work is carried on at the center of the shop and heavy work at the rear. They show the high-lift mobile crane and the overall layout of the unit when opened for work or closed for travel. A blueprint type

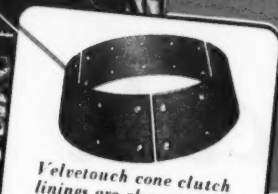
of layout illustrates the location of each of the machines and tools found in the Couse Type M shop. Specifications provide information on the truck chassis, the equipment provided with the Type M, and other miscellaneous data.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 43.

ALLIS-CHALMERS SPECIFIES...

Velvetouch

ALL-METAL STEERING CLUTCH FACINGS ON THE NEW HD-19



Velvetouch cone clutch linings are also standard on Gar-Wood Models CU-1 and CU-2 cable control units.



Steering clutch disc for HD-19.

Like other leading manufacturers of heavy duty tractors and earthmoving equipment, Allis-Chalmers specifies Velvetouch for dependable power control. Because the powdered metals, used in making Velvetouch clutch facings and brake linings, are scientifically processed to minimize chattering and slipping... insure smooth, positive action. Genuine Velvetouch lasts longer, too... for it's all-metal... can't rot in oil or "burn" like conventional material. Send for descriptive literature today.

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1374 East 51st St., Cleveland 3, Ohio

FOR BRAKE AND CLUTCH USE



THE S. K. WELLMAN CO.
WAREHOUSING CENTERS
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LOS ANGELES 1110 S. Hope St.
PHILADELPHIA 636 N.W. 16th Ave.
PORTLAND 424 Bryant St.
SAN FRANCISCO 424 Bryant St.
TORONTO, ONTARIO, CANADA
The S. K. Wellman Co. of Canada, Ltd. 197 Laird St.

WORLD'S LARGEST MANUFACTURERS OF ALL-METAL CLUTCH FACINGS AND BRAKE LININGS

Save Money with YAUN

Yes, YAUN saves you money. Every bucket is engineered to give years of faithful, profitable service. All welded construction, perfect balance and the satisfaction of thousands of users are your guarantee that YAUN does the job right. If you haven't become familiar with YAUN'S buckets, ask your dealer.



Perforated Model



Basket Type



Shell Type



YAUN

DRAGLINE BUCKETS AND MFG. PLANT

BATON ROUGE, LA.

Write for folder

Portrait in Print

By BILL QUIRK

Varied Engineering Experience Proves To Be Sound Background for Contractor

WHEN H. J. Friedman of Brunswick, Georgia, formed the Seaboard Construction Co., he brought to the contracting ranks a wealth of experience in civil engineering. This is proving beneficial not only to his own company, but also to the agencies for which he is doing contract work. Territorially, this engineering experience ranges across the country from the plains of the far west to the Golden Isles of the Georgia coast, and on down to Latin America. For the consultant interests of Harold Friedman extended also to Cuba and Venezuela. His company is one of the newest in construction circles, having started operations in January, 1947. Already it is doing as much work as many a larger and longer established firm.

Back in the opening decade of the twentieth century, H. J. Friedman moved with his parents to Twin Falls, Idaho, from Milwaukee, Wis., where he was born and received a high-school education. Impressed by the greatness of the west, the young man wished to have an active part in its development. Accordingly in 1910 he went to work in a survey party for the Oregon Short Line Railroad. He was then 18. Railroad location surveys were being run through the rugged canyon country in those still-pioneering days when the Harriman and the Hill interests were competing for the transcontinental carrying trade.

From a beginning as rodman he progressed to instrument man, at the same time learning the rudiments of civil engineering through extension courses with the University of Wisconsin. Four years later he left the railroad to work on the other side of the fence, doing valuation engineering for the Pacific District of the Interstate Commerce Commission. After five years with the Commission, he had risen within the ranks to the grade of Senior Civil Engineer, and was in charge of a road and track party.

Highway Work

But the urge to get out and see jobs being built was stronger than interest in cost data on paper charts in connection with valuation engineering. So the young engineer took a job for a short time constructing forest roads in Montana for the Federal government. In 1920 the State Highway Department of Georgia, realizing the impending need for more roads to handle increasing motor-car traffic, was seeking engineers with practical experience to build highways. Friedman left the far west for Dixie, and went to work in the Fifth Division of the Georgia State Highway Department which has its headquarters in Savannah.

By 1927 he had advanced step by step to the position of Division Engineer. While in that capacity Friedman had under his supervision one of the biggest

projects in the state—the construction of Coastal Highway U. S. 17, which extends about 150 miles through Georgia from South Carolina to the Florida line. This important north-south artery developed from a narrow dirt road to a modern paved highway. It has since been widened, and will eventually become a dual highway with four lanes.

In the meantime Friedman had married his attractive secretary, Edna Lee, a native of the Peachtree State. He served as Division Engineer until 1933 when he left the State Highway Department to go with the Public Roads Administration as Highway Engineer, be-



C. & E. M. Photo

H. J. Friedman formed the Seaboard Construction Co. in January, 1947, when he was 55, bringing to the contracting ranks a wealth of civil-engineering experience which extends from the far west to the Georgia coast, and on down to Latin America.

ing assigned to the state of Alabama. Four years later, in 1937, he returned to Georgia as Engineer-Director of Glynn County. And this post he held

until January 1, 1947, when he resigned to enter the contracting business and be his own boss.

(Continued on next page)

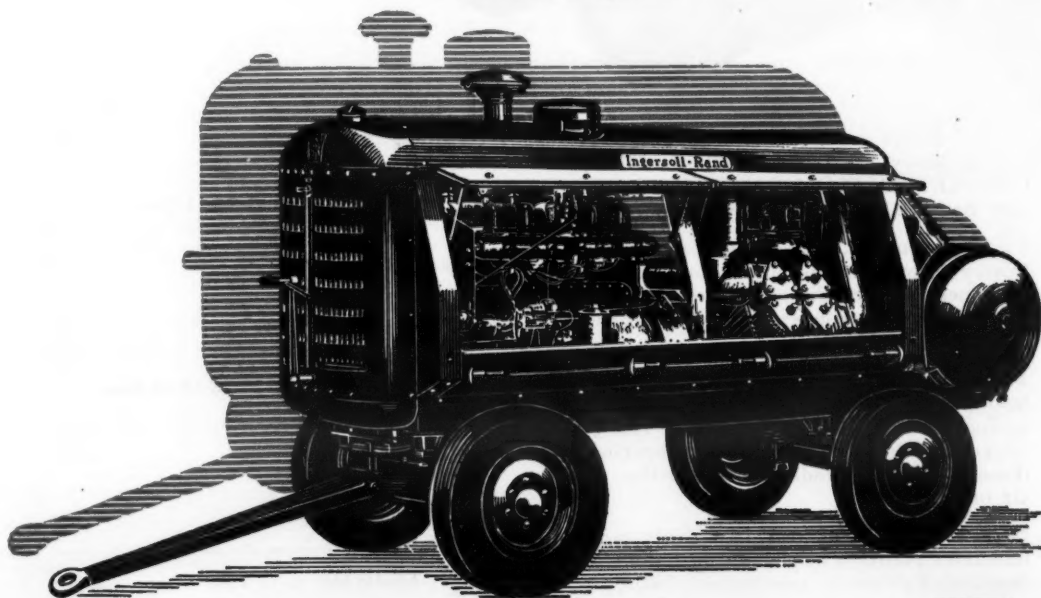


for men who demand Quality in a Portable Compressor

A MOBIL-AIR Compressor gives you the same smoothness and reserve of power, the same beauty of a job well done, the same fitness to do its job, and the same ruggedness and stamina that you demand in every top-quality machine.

Perhaps you have always used Ingersoll-Rand portable compressors, or you may always have wanted one. It's natural for men to desire possession of the finest machines, and to want to work with them.

If you are not able to get the size MOBIL-AIR Compressor you need when you need it, you may find it worth waiting for... one of the new KA-Series MOBIL-AIR equipped with the Drill-More Regulator.



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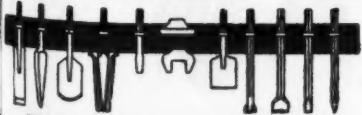
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"BICKNELL BETTER BUILT"

PAVING BREAKER TOOLS



We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

Write for descriptive circular

BICKNELL MANUFACTURING CO.
LIME STREET ROCKLAND, MAINE

Varied Experience Useful to Contractor

(Continued from preceding page)

Glynn County

Glynn County, on the southeastern coast of Georgia, is unique among the counties of Georgia and of the country as a whole. For it embraces the three best known of the Golden Isles strung along the Georgia coast where the warm Gulf Stream currents flow. These three islands—St. Simons, Jekyll, and Sea Islands—are crammed full of history and romance reaching back 400 years into the past. The sub-tropical islands, renowned for the scenic grandeur of their huge live oaks hung with Spanish moss, their bright ever-blooming flowers, or the variety of bird life in their mild climate, have been a mecca for tourists and travelers.

The County and City of Brunswick maintain and operate a 4-mile causeway from Brunswick, the county seat on the mainland, to St. Simons Island.



C. & E. M. Photo
Seaboard Construction Co.'s President H. J. Friedman has his offices on the second floor of a spacious barrack-like frame building in the South Shipyard of Brunswick, Ga., where the U. S. Maritime Commission built merchantmen during the last war.

The causeway crosses the marshes of Glynn, memorialized in verse by Sidney Lanier, Georgia's greatest poet. The

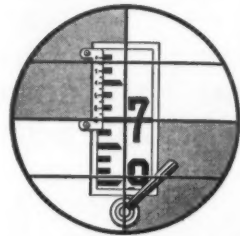
road also bridges several streams including the Frederica River, which at this point is part of the great inland waterway along the eastern seaboard.

As Engineer-Director, H. J. Friedman initiated planning and zoning, and developed the program to such an extent that Glynn County is now regarded as a model in this respect. It and Hamilton County in Tennessee—a much larger county, incidentally—are generally considered the two outstanding counties of the southeastern states from this point of view. In those sections where zoning is essential, Glynn County is divided into residential, business, and industrial areas. This regulation also places restrictions on the use of advertising signs. During Friedman's tenure, the Planning Board, with Mrs. G. V. Cate as Chairman, removed more than 2,000 such signs which were considered undesirable aesthetically.

Within the past few years the County constructed on St. Simons Island a new sewage-treatment plant. A new sani-

(Continued on next page)

When You're On Target With a White...



You're Absolutely Right

● You can be absolutely confident of precision results with White instruments. That's because every step in their manufacture is made with that thought in mind. For example, the metals used in making various parts are a special bronze, brass and nickel silver. Whenever advisable, individual parts are carefully heat-treated to remove all internal stress and strain.

● But that's only part of the story—all graduations on White instruments are guaranteed for accuracy—they're made by a special dividing engine in a totally enclosed heat-controlled, air-conditioned room. Graduating surfaces are grained Sterling Silver to reduce reflection and preserve accuracy.

● Finally—White instrument optics are coated—to transmit the brightest and sharpest possible image through the sighting telescope. Brightness is increased as much as 40 per cent because of increased light transmission—contrast is improved by reducing the haze caused by internal reflections.



Universal Level-Transit—an all-purpose instrument with super-accuracy on all adjustments. Rugged construction to stand on-the-job handling. 12" Telescope, 25 power, coated optics, horizontal guarded circle 4 1/2", Verniers read to 5 minutes, vertical arc 3°.

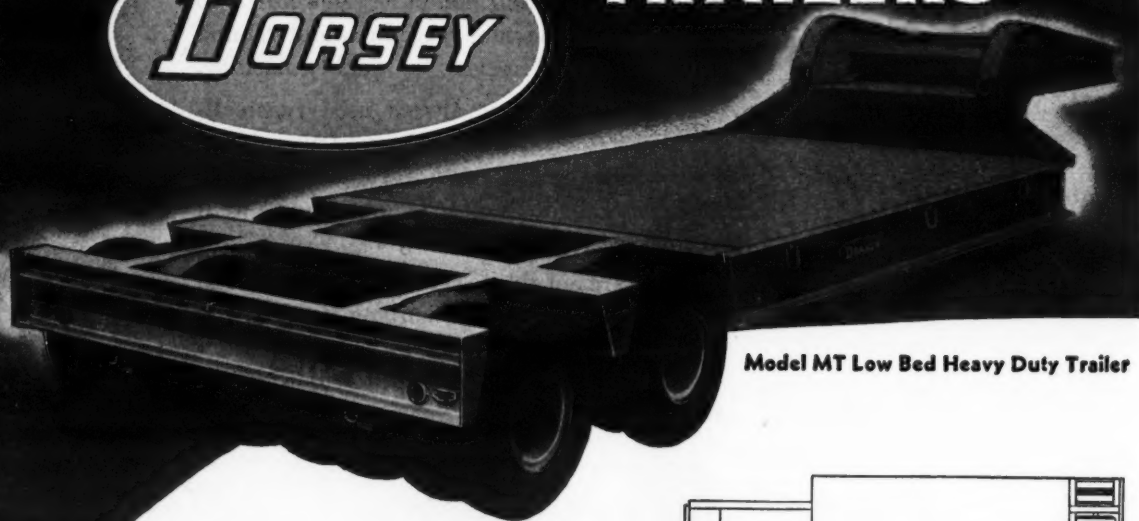
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We do expert repair on all makes of instruments

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BUILT FOR Performance Low Bed HEAVY-DUTY TRAILERS

DORSEY



Model MT Low Bed Heavy Duty Trailer

From years of engineering experience in heavy construction comes the NEW, COMPLETELY REDESIGNED 1948 Dorsey Low Bed HEAVY DUTY TRAILERS.

Unusually rugged, sturdy and compact, the Dorsey Low Beds will move your heaviest equipment, power shovels, tractors, cranes, or stationary machinery, with safety and efficiency.

The Dorsey Low Bed Trailers have the lowest possible center of gravity and are equipped with the safest braking system, larger models being hydraulically operated through master cylinder actuated either by air or vacuum.

Here is a series of real Low Beds, with minimum platform height and including, as Standard Equipment, rear loading ledge, air or vacuum brake equipment, lights and reflectors and tool box.

Get the outstanding Low Bed Trailer
Get a Dorsey



Model M 15-20-25 Tons



Model MTS 15-20-25-30-35 Tons



Model MK 10-15 Tons

DORSEY INC. TRAILERS

ELBA, ALABAMA, U.S.A.

MODERN

Designed

TRANSPORTATION

USE RIGHT BUCKET FOR THE JOB



Hayward makes all three—clamshell, electric motor, orange peel. A Hayward recommendation is unbiased.



THE HAYWARD CO., 32-36 Day St., New York

Hayward Buckets

ary sewerage system was also installed throughout the island, with a connecting line laid under Black Banks River to tie into the disposal system on neighboring Sea Island, one of the country's swank resort areas. Glynn County's black-top roads are likewise models of sound engineering and construction.

Other activities of the busy engineer included consultant work for the National Resources Planning Board in connection with roads, airports, and community planning. Friedman has also acted in an advisory capacity to the Agricultural and Industrial Development Board of Georgia, and to the Georgia Coastal Highway District which includes the six southeastern seaboard counties of the state. His Latin-American work was of a consulting engineering nature in connection with the highway programs of several major oil companies, including Standard Oil and Gulf Refining Co. in Venezuela and Cuba.

Contractor

At 55, when a lot of men think of retiring, this soft-spoken, studious-looking engineer, who gives the impression of having unlimited reserve energy, started out in a new field. With Alfred W. Jones, of near-by Sea Island, as associate, Friedman organized the Seaboard Construction Co. to engage primarily in highway, street, and airport construction. Friedman is President and General Manager, and Jones, although not an engineer, also takes an active part in the firm's contracts. The latter is Chairman of the Board of the Sea Island Co. which operates the Cloister, exclusive resort hotel on Sea Island, and is also Chairman of the Board of the Brunswick Pulp & Paper Co.

Company headquarters are in the South Shipyard of Brunswick where the U. S. Maritime Commission built merchantmen during the last war. The Port Authority of Brunswick acquired the huge shipbuilding plant after the war, and now leases space to industrial users and other interests. The big roomy yard is about ideal from a contractor's viewpoint. Seaboard has its offices on the second floor of a spacious barrack-like frame building, well lighted and ventilated. Across the street is a large machine shop outfitted with heavy-duty machinery for repairs to road-building equipment.

Despite shortages, Friedman has managed to buy for Seaboard a choice assortment of heavy equipment to handle all kinds of jobs involving grading; curb, sidewalk, and gutter work; and every phase of asphalt construction including surface treatment, cold-mix, or hot-mix. He becomes most enthusiastic when on the subject of equipment shortage.

"Most contractors would give their right arm to have what we have here", he said, with eyes sparkling behind his glasses as he pointed to a huge steel-frame structure about 1,000 feet long to the rear of his office. "That big place was the shipyard's fabrication plant. We keep all our equipment in there out of the weather. Its great height permits our cranes to run right in where one

of the overhead hoists, hung from the trusses, can lift off the cab if repairs are necessary."

Trucks are lined up in precise rows down one side. Steel road forms are stacked up neatly, glistening with a protecting coat of oil. Any rolling piece of rubber-tired equipment not in current use is jacked up on blocks to

lengthen tire life.

"We have a rule here", Friedman continued, "that every piece of equipment must be kept ready to go into service at a moment's notice. When a machine comes off a job it is repaired and painted if necessary, then it is greased and oiled, and put in A-1 condition."

First Job

Friedman looks with fondness on a big heavy-duty road-mix machine which he calls his "cash register". The company's first job, early in 1947, was an 11½-mile road contract on State Route 94 in Georgia's mysterious Okefenokee Swamp region. Under adverse

(Concluded on next page)



Here's good news for operators hauling heavy loads of milk, petroleum, machinery... logs and lumber... stone and ore... furniture and freight. Substantial production of GMC 720 series Specialized Tractors and 800 series straight truck models, assures quick delivery.

GMC 720 series tractors have gross combination weight ratings of 40,000 pounds... the 800 series trucks have gross vehicle weight ratings of 30,000 pounds. Both are offered in wheelbases of 136 to 196 inches, with cab-axle dimensions of 60 to 120 inches. Both have big 426 cu. in. engines of the same basic design as the war famous "Army Workhorse." Both have many other features specific to the jobs for which they are built.

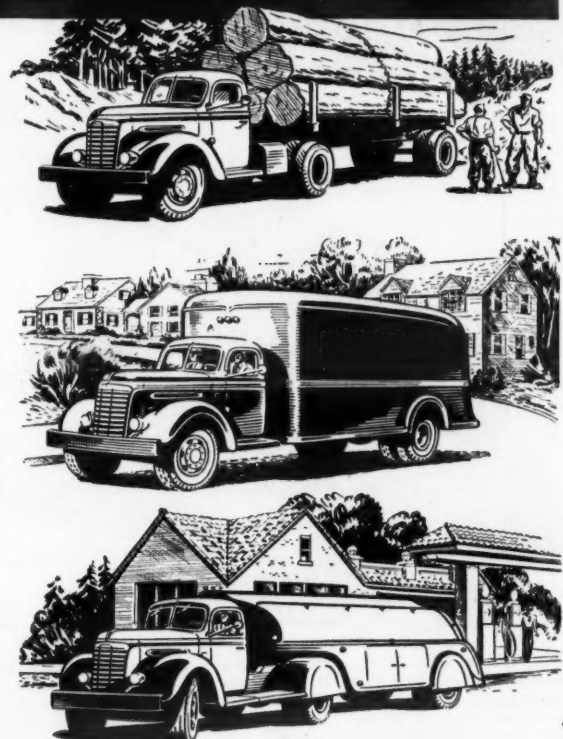
If you need a new truck in either classification, put your money on one of these all-truck, heavy duty GMCs.

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

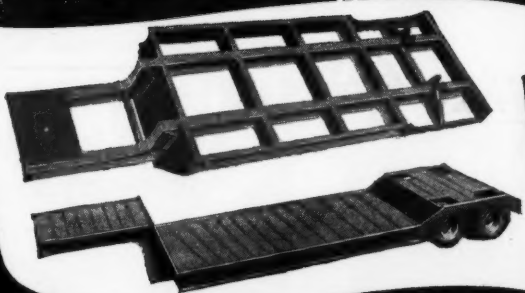
THE TRUCK
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GMC
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All WELDED for Maximum STRENGTH



To meet the demand for a rugged, extra sturdy trailer design... the La Crosse Trailers are ALL WELDED... the entire frame... from the 2 full length heavy duty main beams to the cross members and outer channels... is welded to assure a maximum of flexibility.

Dealers in 48 States



LA CROSSE
WISCONSIN

Used 50-Ton Low-Bed Machinery Trailer HUGHES

8'0" Wide with complete outriggers. 18'3" Platform space. 16-825x15 Tires. Complete new rear axle assembly. Guaranteed as new.

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Box 426

Vineland, N. J.

Phone: 7-1009

Varied Experience Useful to Contractor

(Continued from preceding page)

conditions a 20-foot sand-asphalt road-mix pavement, 6 inches deep, was laid to everyone's satisfaction in 2 months, and surface-treated in the brief period of 4 days.

"One of the satisfactions I got from that job", Friedman commented, "was stockpiling 2,200 tons of slag before starting work, because of the material shortage, and then checking out at the end within a quarter of a carload.

"After that start we laid new pavements here in Brunswick—for housing projects, among others—and also did similar work in South Carolina. At present we have under contract 25 miles of highway paving, plus improvements to the Brunswick Airport which consist of grading, paving, and lengthening the runways. But the heavy rains of the past winter and spring have set the construction program back immeasurably. During that six months' period we received more than a year's normal rainfall. Many contracting organizations have been shut down completely for months. The situation is very bad. We can't hit our stride without getting a break in the weather. All we can do is to hope for a dry spell."

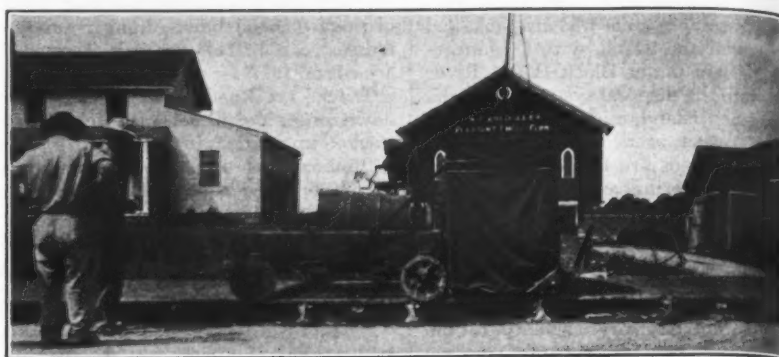
In between rains Friedman manages to indulge in his favorite recreation—surf bathing. His skin, including his balding head, is well tanned by his long sojourn on the Georgia coast. He and his wife live in Brunswick, but have a cottage on near-by St. Simons Island. Their 20-year-old son, Harold L., is studying business administration at the University of Georgia.

"I prefer this part of the country to any other", Friedman remarked. "The islands are always beautiful, winter or summer." Then, thinking perhaps of the Southerner's cheery, hospitable farewell cry, "Hurry back", he added, "Whenever I leave here, no one has to tell me to hurry back. I do that without urging."

Self-Propelled Unit For Concrete Sprays

A new machine for spraying concrete-curing compounds is manufactured by the L. K. Lippert Co., 297 S. High St., Columbus 15, Ohio. It is designed with removable-flange wheels so that it can be used for either first or second-lane work. The traveling frame of this self-propelled machine is adjustable to various road widths. Power is furnished by an air-cooled Wisconsin gasoline engine, and is transmitted to the calibrated gear pump, the traction, and spinning centrifuges through a V-belt transmission.

The 55-gallon drum in which the curing compound is shipped is used as a storage tank on the Lippert machine. It is set in a power-rocked cradle which is said to insure proper suspension of the material at all times during spraying operations. The compound is patterned onto the surface from high-speed spinning centrifuges which are self-cleaning and do not clog, the manufacturer explains. Excess material not required for the pavement pattern is recovered and returned for re-use. According to Lippert, this returned material suffers no deterioration as it is re-circulated. Forward speed of the machine is calibrated to the speed of



The Lippert concrete-curing machine is pictured here at work on U. S. 40 near Brookville, Ohio, depositing membrane compound at the rate of a gallon to 200 square feet. A. W. Burns Construction Co. of Columbus, Ohio, is the contractor on the job.

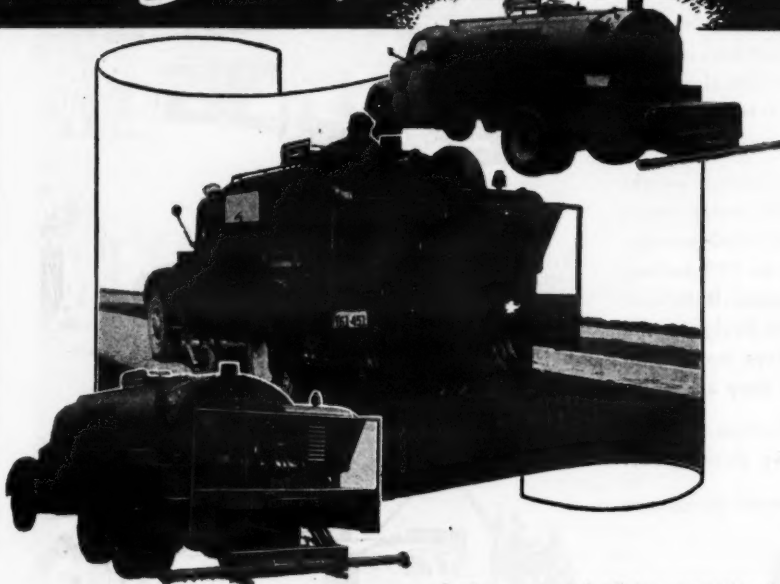
the pump and recovery system to assure the depositing of a precise amount of material per square footage covered. A canvas shroud protects the compound from the wind during spraying.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 54.

Skilsaw Elects Kempfert

Walter W. Kempfert has been elected Vice President in Charge of Sales by Skilsaw, Inc., Chicago manufacturer of portable electric tools. He joins Skilsaw after 20 years of service with the Worthington Pump & Machinery Corp.

WHAT THOSE HIGHWAYS NEED IS A "SPRAY MASTER" ON THE JOB



"Spray Master" Distributors are designed for low cost, efficient Road Building and Maintenance. Operating time is cut to a minimum. With a 24 ft. Vacuum Flow Full Circulating Spray Bar asphalt, tar, emulsion or road oil can be sprayed with razor like precision. No gadgets to mess with either, the "Spray Master" has one valve for starting and stopping the spray. Manual operating individual nozzles can reduce the spraying width in a few seconds.

Low cost and efficient operation is the watchword of the Littleford "Spray Master." The Faster Heating System, Hydraulic Spray Bar Adjustment, Circulating by Vacuum not pressure, Heat Chamber, are only a few of the advantages the "Spray Master" gives as standard equipment. Made in sizes from 800 to 3000 gal. truck mounted or frameless semi-trailer. For Better Roads use the best equipment, the "Spray Master" Distributor. Write for Bulletin No. 14.

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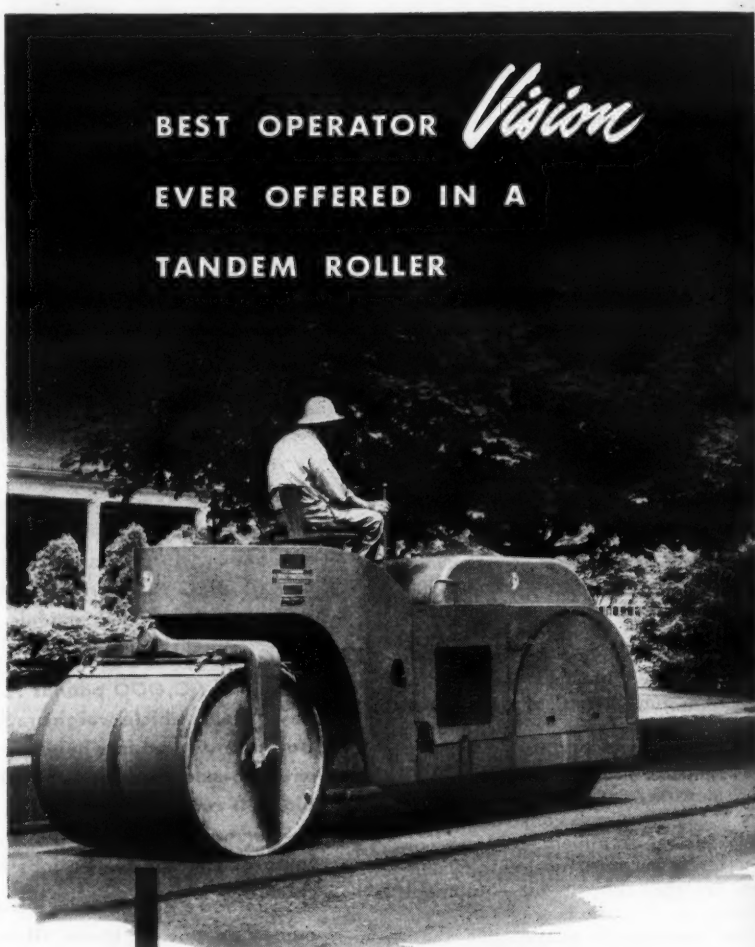
"Spray Master" Pressure Distributors
Highway Brooms
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LITTLEFORD

LITTLEFORD BROS., INC.
485 E. Pearl St., Cincinnati 2, Ohio



A roller operator must be able to see where he is working at all times without difficulty. That's why the new Buffalo-Springfield tandem rollers, with the sides of their drive roll hoods relieved and their final drive placed on the side opposite the operator, present the most complete vision ever offered in tandem rollers.

BUFFALO  **SPRINGFIELD**
SPRINGFIELD, OHIO

Concrete Apartments Are Built at Fast Clip

Crews Hit Pouring Speed Of 540 Yards a Day; All Concrete Is Truck-Mixed And Handled by Cranes

By MELVIN DEAN

APARTMENT houses with reinforced-concrete frames are going up at a rate of three stories a day on the Lillian Wald housing project in Manhattan's lower East Side. (See C. & E. M., June, 1948, pg. 2.) Some 540 yards of concrete are poured per day, all of it from buckets hoisted by cranes.

The buildings in the project total 16—the 4 corner ones are 11 stories high, and the other 12 are 14 stories high. While not identical, they are similar in shape and size, and average 165 feet long x 91 feet wide, extreme outside dimensions. They take up an area of 126,236 square feet on a 16½-acre tract of land formerly occupied by slums and tenement houses. When completed, the housing project will have a population density of 423 persons per acre.

The new buildings are supported—as described in the previous C. & E. M. article—on 6,470 piles driven by the Raymond Concrete Pile Co. of New York City. These piles are of the step-taper type and were driven to depths of from 40 to 110 feet, with an average depth of 72 feet. Each is designed to support a load of 30 tons. A concrete slab averaging 3 feet in depth caps each cluster of from 2 to 22 piles.

Total cost of the piles, foundations, and superstructure—exclusive of plumbing, heating, electrical, and site-improvement work—is estimated at \$13,400,000. The general contractor is the HRH Construction Corp. of New York City. Foundations were handled by Corbetta Construction Co., Inc.; the concrete superstructure is being built by the Knickerbocker Concrete Arch Construction Co.; and the brick work is being performed by Andrea La Sala Contracting Co., Inc.—all of New York City.

Foundations

The concrete foundations are 10½ inches thick and were poured at a rate of two buildings per week, with the first concrete laid on February 16, 1948. Standard plywood forms were used. Concrete was delivered by Colonial Sand & Stone Co., Inc., of New York City, using an average of 7 trucks. It was poured from a 1-yard Insley concrete bucket lifted by a Lima crane with a 75-foot boom. Between 800 and 900 tons of steel and 8,000 yards of concrete went into the foundations and pile caps.

Superstructure: Job Set-Up

The speed with which the concrete superstructures of these buildings are going up is due in large measure to the way the job is laid out. No trade is kept waiting, and as soon as a set of forms is stripped, it is moved to the next floor above. Moreover, reinforced

steel needed for an entire floor is pre-assembled to speed up operations. It is prepared in the steel-supply yard and stored on trailers for delivery as soon as the steel crew is ready for it. Then entire sections are lifted into place from the trailers by two Bay City cranes used exclusively for this operation. In general, steel is delivered, cut to size, by the Bethlehem Steel Co. However, the contractor's shop is also set up to prepare steel in the lengths needed.

Pour Preparations

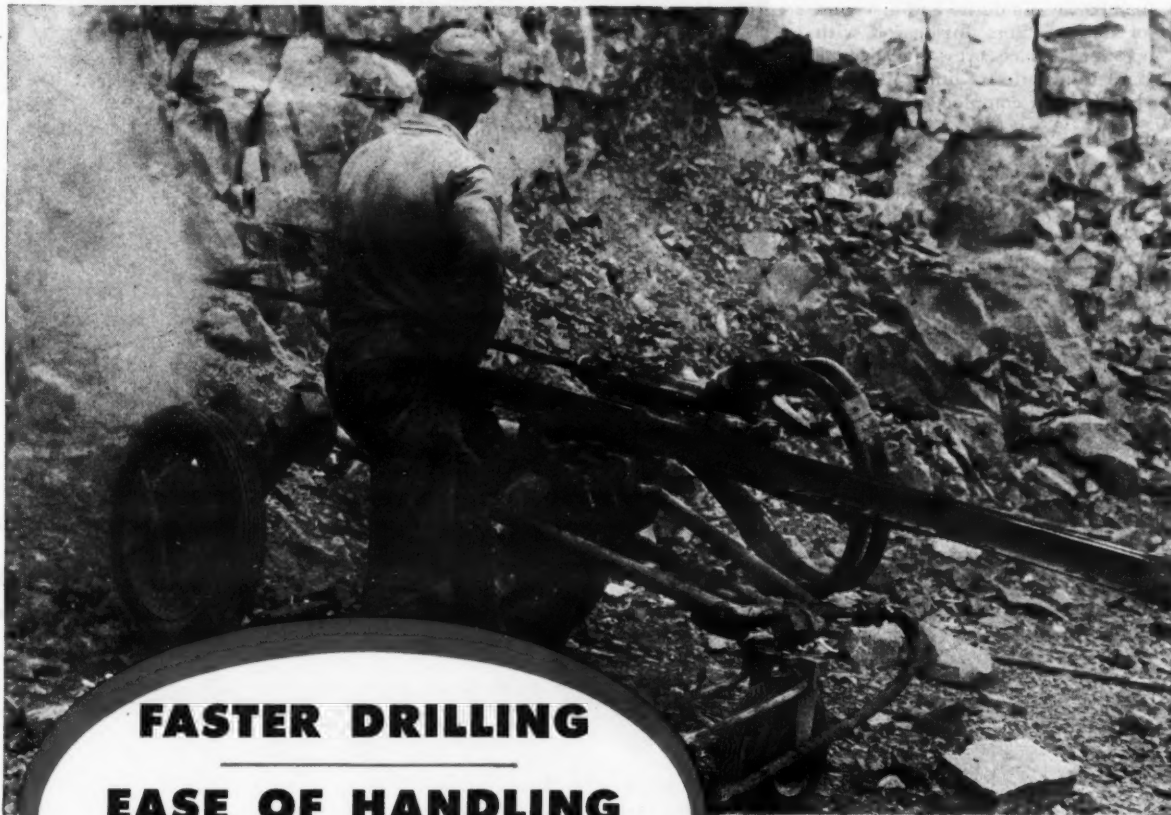
The carpenter gang consists of five crews—one to set the column forms; two for beam forms; one for slab forms; and one for finishing and final checking.

(Continued on next page)



C. & E. M. Photos
These views of concrete superstructure work on the Lillian Wald housing project show Insley 1½-yard buckets being loaded with truck-mixed concrete (above), and lifted to the forms by Lima cranes (at right).

JOY ONE-MAN LIGHTWEIGHT WAGON DRILL



FASTER DRILLING
EASE OF HANDLING
LOW MAINTENANCE

Above, drilling toe-holes—no need to stop drilling to blow. Piston speed and blow automatically adjusted to give fast, consistent and economical drilling in every kind of formation—especially in overburden, clay seams and other material that varies from hard to soft.

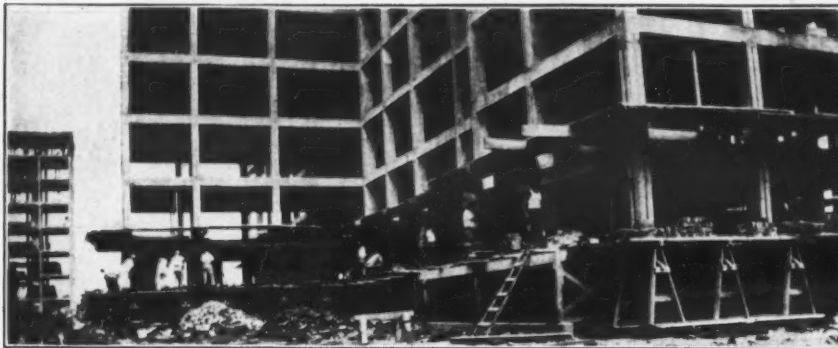
You'll get more hole per shift, at lower costs, with the exclusive "drill and blow" feature of the JOY Lightweight Wagon Drill. And it's really lightweight—only 750 lbs.—easily operated by one man. Mounts JOY 55 or 65-pound sinkers, and 3" or 3½" drifters, as needed... requires no spikes due to the positive locked brakes. JOY pioneered the Lightweight eight years ago—more than 500 now in operation. It can save you time and money—write for bulletin.

Consult a Joy Engineer

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C. & E. M. Photos
Bricklayers, above, put a 4-inch wall of facing brick on a Lillian Wald building. In the other photo, left to right: Assistant Superintendent James A. Loscalzo, Superintendent Louis Gargiula, Project Manager C. H. Davidson, General Superintendent Francis X. McCarthy, Chief Engineer G. F. Hayden, and Joseph Pagliaro, Treasurer for Knickerbocker.

Concrete Apartments Are Built at Fast Clip

(Continued from preceding page)

A special type form is used for the floors throughout the building. They consist of a Douglas fir plywood to which a resin-impregnated fiber material is bonded. These overlaid panels were furnished by the Carl Besch Co. The forms for the columns are 3/4-inch plywood. For the walls, Richmond tie rods are used. A special wedging system brings the forms up tight prior to pouring. An angle clip is fastened to one side of the form and is pulled up tight by driving a wedge into the other side.

As soon as floor forms are set, a crew of steel workers moves in and lays the bottom steel. A crew of electricians then installs the conduits; and a second crew of steel workers finishes off with the top steel. Each crew averages 2 hours and 15 minutes to finish its share of the work for a complete floor.

Concreting

The floor and ceiling slabs average 5 inches thick, and each takes about 180 yards of concrete. A total of about 4,000 tons of steel reinforcing bars will go into the 225 slabs in the buildings. The columns are reduced in size at the seventh and eleventh floors. The beams are 30 inches wide and 10 inches deep.

Concrete is furnished by the Colonial Sand and Stone Co. and averages a 4 1/2 to 5-inch slump. Two test samples of it are taken each day. It varies in strength from 1,750 to 3,500 pounds, depending on its use, location, and reinforcing. Typical weights for the

3,000-pound concrete are:

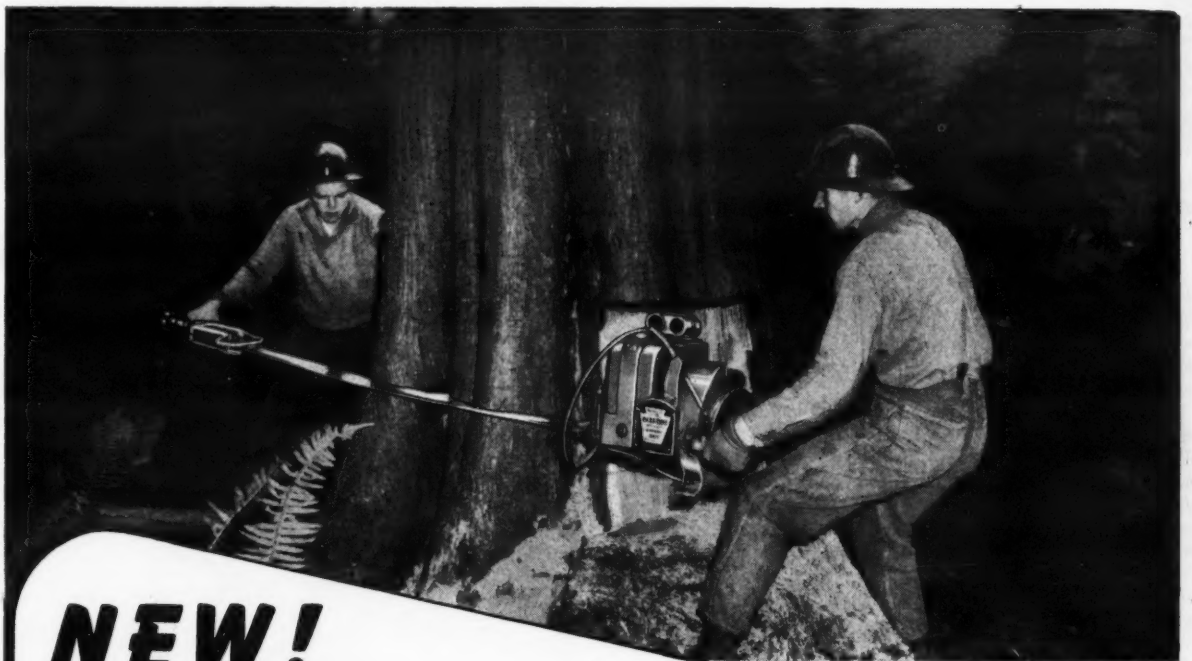
Cement	510 lbs.
Sand	1,250 lbs.
Gravel	2,000 lbs.

Two cranes handle the concrete—a Lima 802 using a 2-yard Insley bucket, and a Lima 750 using two 1 1/2-yard

Insley buckets. Both cranes have 125-foot booms at present; these booms will be extended to 145 feet to reach the highest pours. The concrete crew averages three complete slabs a day, or 540 yards. Time required for each 180-yard pour is about 2 1/2 to 3 hours. The

concrete is vibrated in place, using Stow vibrators, and is cured with Ritcure compound.

Each floor is completely finished as the job progresses, with the exception of the stairways. These are poured (Concluded on next page)



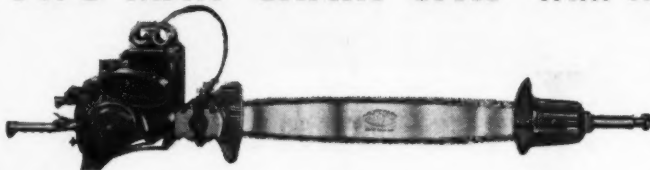
Soft woods, or hard woods, the Disston 12 H.P. Chain Saw takes them all in stride.

NEW!

THE EXTRA POWERFUL

DISSTON 12 H.P. HEAVY-DUTY

TWO-MAN CHAIN SAW with Mercury Gasoline Engine



Put this husky Disston Chain Saw to work on your toughest timber-cutting jobs. See how fast it gets them done. Note how smoothly the saw cuts through knots and wet, frozen or abrasive woods. It's built specially for work like that . . . with extra reserve power and extra ruggedness for dependable performance in ALL heavy-duty felling and bucking operations.

This new model retains all the fine qualities of other Disston chain saws, PLUS added power and other features to further boost your production and cut costs. To name a few:

New 12-hp., 2-cycle, 2-cylinder engine . . . an abundance of power.

New—Quick-Detachable Tail Stock.

New Guide Rail.

New Transmission . . . with more rugged housing to withstand rough treatment.

New Abutment Plate . . . shape provides additional protection for transmission by keeping saw out from under a bucking cut.

Write for full particulars and name of nearest dealer.



HENRY DISSTON & SONS, INC., 1074 Tacony, Philadelphia 35, Pa., U.S.A.

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EASY TIME PAYMENT PLAN

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The Disston Time Payment Plan, serviced by Walter E. Heller & Co., installment experts, provides a sound, generous, easy-to-pay method of financing the purchase of a Disston Heavy-Duty Two-Man Chain Saw.

20% Down Payment

(For 36" Model at Present Prices)

\$131 DOWN

APPROX. \$48 PER MONTH

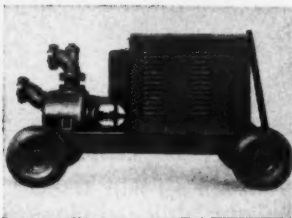
12 MONTHS TO PAY

AUTHORIZED DEALERS and CERTIFIED SERVICE STATIONS

from coast to coast always ready to serve you. Let your dealer show you how easy it is to own one of these profit making saws . . . how easy it is to pay.



CARTER



**HUMDINGER SELF-PRIMING
CENTRIFUGAL
PUMPS**

You've never seen a self-priming centrifugal pump that will move so large a volume of water as efficiently and with as little maintenance as the new "HUMDINGER 8" Model 125 MCCH.

Combining all the features of large air capacity, simplicity and rugged construction with the exclusive CARTER ball type priming and co-axial volute, this unit is guaranteed to give you unfailingly satisfactory service.

● For complete details, write for bulletin 4503.

**RALPH B. CARTER CO.
HACKENSACK, NEW JERSEY**

61 PARK PLACE, NEW YORK 1, N. Y.

water from two stories above. Concrete is chuted down through elephant trunks as the higher floor is poured.

Finishing and Facing

After the forms are stripped, masons take over the finishing work. Joints are filled with Bondcrete compound, and ground smooth by Berg concrete-surfacing machines. Three Lindsay air compressors are used to drive chipping hammers and other air-operated finishing equipment.

The buildings have a 10½-inch exterior brick wall consisting of 4 inches of facing brick and 6 inches of tile backing. Four buildings are worked at one time. The stair halls—of glazed tile—are carried up with the brick walls. The outer walls have a wire-lath furring, and the interior partitions are lath and plaster 2¼ inches thick. The floors are of asphalt tile applied directly to the concrete slab.

Personnel

Francis X. McCarthy is General Superintendent for HRH; George F. Hayden is Chief Engineer on the project; C. H. Davidson is Project Manager for Knickerbocker, assisted by Louis Gargiula, Superintendent, and James A. Loscalzo, Assistant Superintendent. The average number of men employed on the superstructure, exclusive of supervisory personnel, is 900.

Calif. Right-of-Way Law

Controls Building Permits

California's new Weber Act is expected to save the state thousands of dollars and endless trouble in obtaining right-of-ways. For it authorizes control of building construction on planned locations of state highways in unincorporated areas. Under the procedure set up by this act, the State Division of Highways is to submit to the county planning commission, or its equivalent, copies of maps showing the location of proposed state highways which have been laid out and surveyed. These maps must be in sufficient detail to show the location of each parcel of land to be traversed in the county.

The county then will prepare a precise plan showing the right-of-way. This plan will be submitted to the governing body of the county for approval and adoption. When approved, it is then to be filed with the agency whose duty it is to issue building permits in the unincorporated areas. Thereafter, no building may be erected without a permit, in the proposed right-of-way, except for temporary structures costing less than \$500.

The law provides, however, that property owners denied building permits may request a hearing before an appeals board. The board is usually the governing body of the county, but it may be a special group if appeals are too numerous to be handled by the former body. This group will then determine if an undue burden is placed upon the property owner, or if the best interests of the state are being served.

The law requires that due note be taken, in assessing the property, of any decrease in value resulting from the establishment of the location of the highway. Also, administrative procedures formulated by the Division of Highways for carrying out this act indicate that it will be used only in connection with the widening of existing highways where ultimate widths of right-of-ways are definitely known, and where construction will start within a 3-year period. These restrictions on the use of the act are considered expedient because of two weaknesses in it: (1) that no time limit is specified, and the owner's use of his property is tied up indefinitely without compensation; and (2) that the filing of plans for a large number of projects before construction is actually contemplated might work contrary to the state's interest.

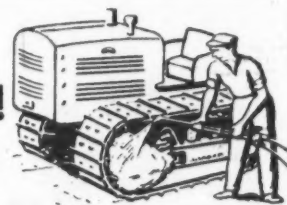
Plows for Many Purposes

A 4-page folder listing a line of plows for use in all types of mixed-in-place road work, in soil preparation for airport or roadside seeding, and a variety of similar operations is being distributed by Hester Plow Co., Inc., of Jacksonville 1, Fla. This equipment includes the Hester 3, 4, and 5-disk Straitline plows, the fire-line plow, the 5-disk standard, the 5-disk wide-cut, and the 3-disk utility. Also listed is the Hester mix-in-place plow. This is a 5-disk Straitline type designed especially for mixing sand-clay roads and other types of mixed-in-place construction.

Each of these units is described in detail, and photographs illustrate its features. Power requirements, width of cut, and other specifications are covered. The folder also points out the special features of operation and construction of the Hester plows.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 70.

Fast way to clean your heavy equipment!



Let the combination of heat, pressure of the Oakite Steam Gun plus the vigorous detergency of Oakite materials simplify tough cleaning jobs.

You'll find it your best bet for fast, low-cost removal of grease, muck, asphalt. All you need is steam, the Oakite gun and a solution of recommended Oakite cleaner. The rest of the procedure is a matter of aiming the gun. Use it to clean cranes, crushers, diggers, tractors—wherever maintenance cleaning looms as a big job.

Your local Oakite Technical Service Representative will show you how Oakite Steam-Detergent Cleaning can cut your cleaning costs. Get in touch with him today. No obligation.

OAKITE PRODUCTS, INC.
72 THAMES ST., NEW YORK 6, N. Y.
Technical Service Representatives
Located in Principal Cities of
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MATERIALS
METHODS
SERVICE

Specialized Industrial Cleaning

**Profits go up
as this pipe goes down**

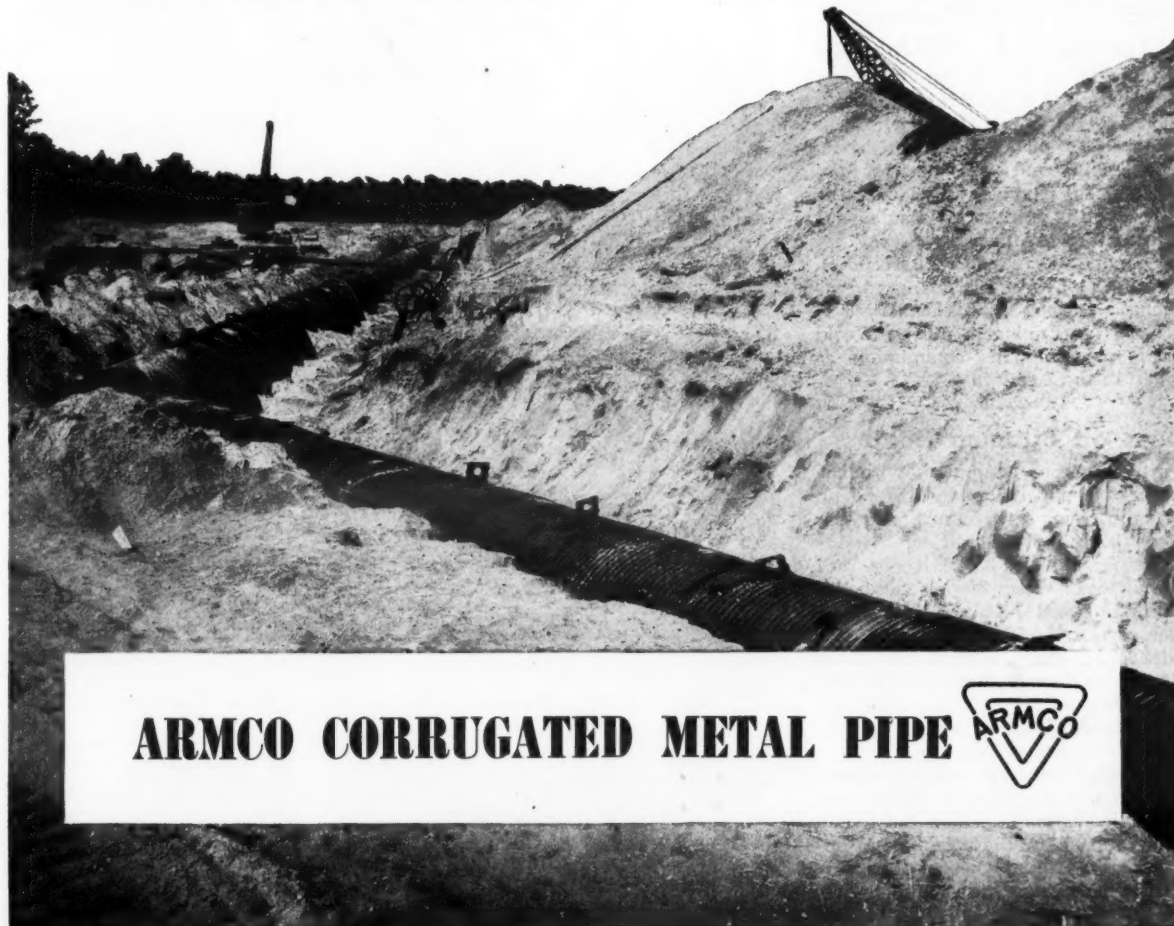
Experienced contractors know that pipe costs should be figured on an *installed* basis. This is why drainage jobs done with ARMCO Pipe permit lower bids and greater profits.

Savings start the minute you begin to haul or handle ARMCO Corrugated Metal Pipe. Although amply strong it often weighs only one-tenth as much as more massive types. A few unskilled men quickly make the installation without special equipment. Using simple band couplers, it takes only a surprisingly short time to join individual lengths, 20 feet

or longer, into a sturdy, tight conduit. Long, straight lengths make it easy to maintain line and grade. There is little or no foundation work because ARMCO Pipe has beam strength to span the soft spots. Breakage is no problem in handling or backfilling.

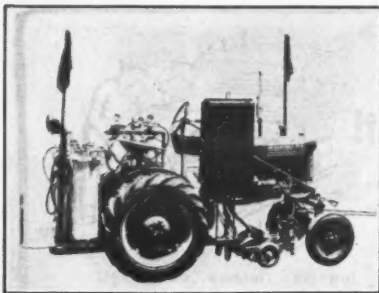
Bid low on that next contract with ARMCO Corrugated Metal Pipe. You will find it ideal for highway, railroad, airport or municipal installations. Write for complete data. Armco Drainage & Metal Products, Inc., 3905 Curtis Street, Middletown, Ohio.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION



ARMCO CORRUGATED METAL PIPE





The Butler Model L-4 traffic-line marker is self-propelled and can be used for painting 1, 2, or 3 lines simultaneously in widths of up to 4 inches.

Traffic-Line Marker Is Made in 2 Styles

Traffic-line markers in two styles are manufactured by Butler Industries, Inc., 6450 Le Grand Ave., Detroit 11, Mich. The Model L-4 is a self-propelled unit and can be used for painting 1, 2, or 3 lines simultaneously in widths of up to 4 inches. Special widths are available as ordered. The Model M-6 can be used to paint lines of any width between 2 and 6 inches; with an auxiliary gun, it can be used for marking curbs, hydrants, poles, guardrails, fences, bridges, and other objects. Both units can be equipped with a Butler bead dispenser.

The Model M-6 is powered by a $\frac{5}{8}$ -hp Johnson or a $\frac{3}{4}$ -hp Briggs & Stratton gasoline engine. It has a Saylor-Beall Model 1410-K compressor and a Saylor-Beall external atomizing type of spray gun. The flow of material is controlled by a trigger located on the right-hand side of the machine's handles. Total weight of the M-6 is 165 pounds.

The Model L-4 can be tractor-mounted or set up for trailer mounting on trucks. All spraying and bead-dispensing operations are controlled from the panel of the marker. It can handle two different colors of paint at one time, in quantities of up to 15 gallons each. Air agitation is provided in the paint tanks. An auxiliary hand gun is provided as standard equipment. According to the manufacturer, the L-4 can be easily dismantled to free the tractor or trailer for other uses.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 23.

Captain H. C. Whitehurst, Treasurer of ARBA, Dies

Captain H. C. Whitehurst, Treasurer of the American Road Builders' Association since 1940, died recently. He was Director of Highways for the District of Columbia, and President of the Association of Highway Officials of the North Atlantic States. He was also a member of the American Society of Civil Engineers, American Association of State Highway Officials, and the National Research Board. He served in the Corps of Engineers during World War I, resigning his commission as Captain in the Army in 1929.

Data on Bitumen Heaters

Portable steam generators with capacities of 80 and 125 hp and 150-pound maximum working pressure are described in a bulletin put out by the Cleaver-Brooks Co., 333 E. Keefe Ave., Milwaukee 12, Wis. Models described in Bulletin No. RM-105 are the LFM-8, which carries the 80-hp rating, and the Model LFM, which carries the 125-hp rating. Also described are the Cleaver-Brooks heaters for handling tank cars of bituminous materials, and the Cleaver-Brooks pumping Boosters.

Detailed information on each of these machines and the sizes in which it can be supplied is contained in the folder. Photographs show the machines in operation on various types of jobs, and specification lists provide complete data on construction and operational fea-

tures.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 4.

Bridge Engineer for Texas

The appointment of Randle B. Alexander as Bridge Engineer of the Texas Highway Department has been announced. He succeeds James P. Exum who has resigned to join the firm of Howard, Needles, Tammen & Bergendoff, Consulting Engineers, in New York.

A graduate engineer of the University of Texas, Mr. Exum leaves behind a notable record in the design of important bridges in Texas. As a member of the American Association of State Highway Officials Bridge Design Committee, he spearheaded a successful move to revise and modernize standard bridge specifications throughout the nation.

Alexander is a graduate of the University of Michigan and has been with

the Texas Highway Department for 25 years. At present he is Supervising Construction Engineer for the new express highway being constructed be-

tween Houston and Galveston. He also represents the Department on the Morgans Point Tunnel under the Houston Ship Channel.

DAREX AEA

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The accepted air entraining agent for concrete
Already used in over 50,000,000 yards of concrete on
all types of construction

Darex AEA is backed by a competent engineering field service.

Darex AEA is conveniently available from distributors' stocks all over the United States and Canada.

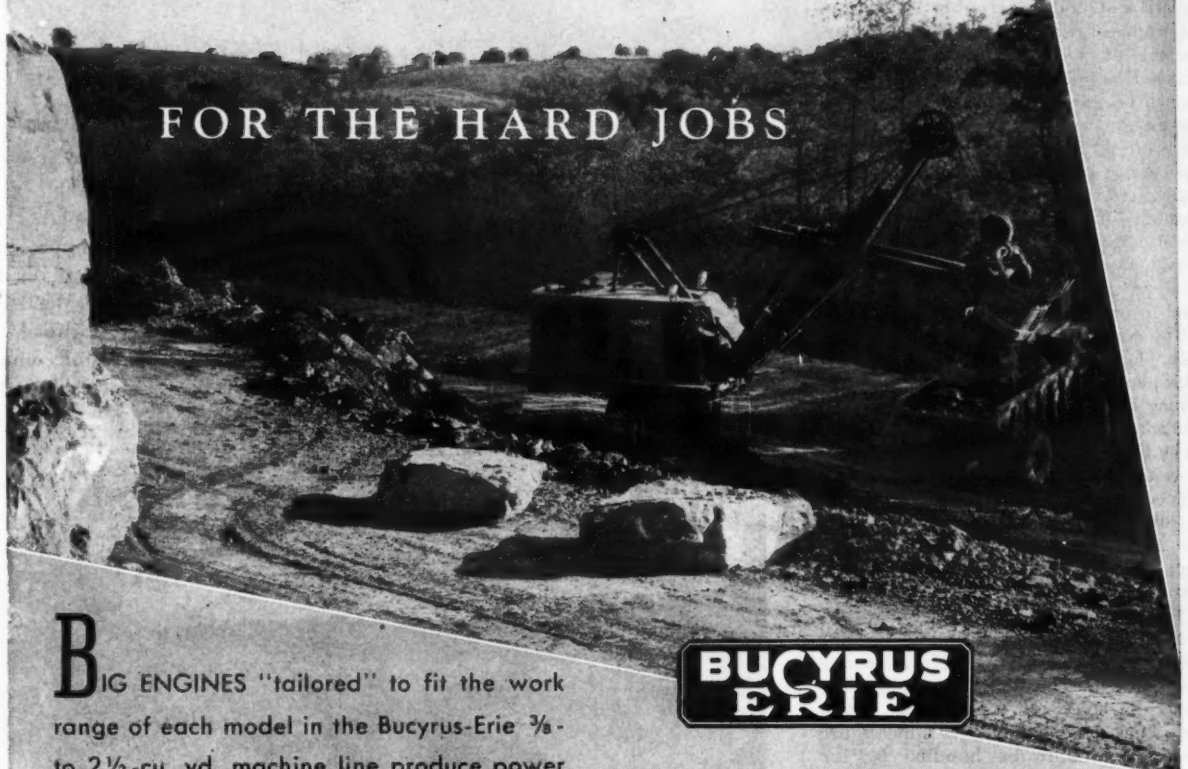
DEWEY AND ALMY CHEMICAL COMPANY

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Plenty of Punch

FOR THE HARD JOBS



BIG ENGINES "tailored" to fit the work range of each model in the Bucyrus-Erie $\frac{3}{8}$ - to 2 $\frac{1}{2}$ -cu. yd. machine line produce power to meet all demands of excavator and crane service. Simple, efficient, long-lived machinery keeps this power always under the complete control of the operator, who can apply it exactly where he wants it, when he wants it, in the amount he needs.

Transmission is efficiently yet simply lubricated, and wide use of anti-friction bearings for a smooth power flow over a minimum of moving parts further reduces power losses through friction. The smooth-

**BUCYRUS
ERIE**

ness and balance of Bucyrus-Erie power add ease of operation to capacity for long hours of sustained production. Durability of parts and reduction of wear keep maintenance costs low, too.

There are many more reasons why Bucyrus-Eries are "tops" among owners and operators alike. See your Bucyrus-Erie distributor for more information on how Bucyrus-Eries can help solve your excavating problems efficiently and economically.

BUCYRUS-ERIE CO. SOUTH MILWAUKEE, WISCONSIN

Work Gets Under Way On Jim Woodruff Dam

Initial Contract Involves Construction of Overflow Dike Section; Others to Follow as Funds Permit

By WILLIAM H. QUIRK,
Eastern Editor

DEVELOPMENT of flood control, navigation, hydroelectric power, and recreational facilities on the Apalachicola River and its principal tributaries, the Chattahoochee and Flint Rivers, got under way this year with the start of construction on the Jim Woodruff Dam near Chattahoochee, Fla. This Corps of Engineers project actually began last October, but heavy rains throughout the winter and early spring prevented any real progress. The initial contract for the construction of the overflow dike section of the dam was awarded to W. C. Shepherd Co., Inc., of Atlanta, Ga., on its low bid of \$753,000.

The South Atlantic Division of the Corps of Engineers is directing the construction, with the field engineering and inspection supervised by the Mobile, Ala., District Office. This first contract is scheduled for completion early next year. Contracts for succeeding phases of the work will be awarded as funds are made available, and it is anticipated that the entire dam may be completed by the spring of 1952. The total cost at present-day prices is estimated at \$42,000,000.

Besides the Jim Woodruff Dam, three other main dams are included in the development of this river system in west Florida and south Georgia. The Jim Woodruff Dam—named after Jim Woodruff, a business man of Columbus, Ga., who visualized the benefits of the project and worked many years for its realization—is at the head of the Apalachicola River. It is about 1,000 feet below the confluence of the Chattahoochee and Flint Rivers which form the Apalachicola. Other dams include the Upper Columbia (Ala.) Dam, about 50 miles above the Jim Woodruff site; one at Fort Benning, Ga., about 20 miles below Columbus, Ga.; and another at Buford, Ga., about 50 miles above Atlanta. All three are on the Chatta-

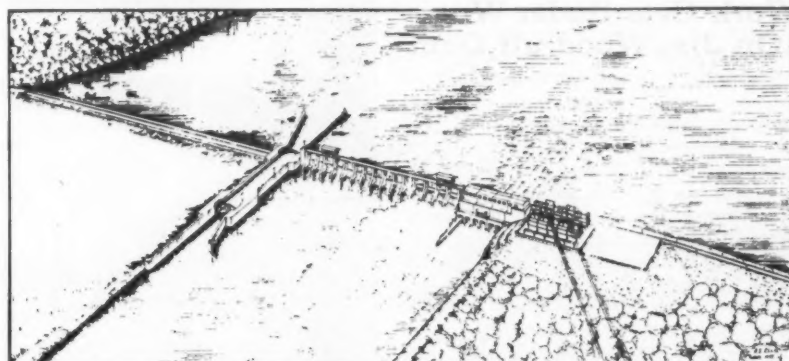
hoochee River. No work has been done on them, however. The Buford Dam Reservoir will provide storage for flood control, for power at the dam, and for increasing low-flow-season discharges downstream from the dam to the benefit of Atlanta's water supply, downstream hydroelectric plants, and navigation.

At present the Apalachicola River has a 6-foot channel from its mouth in the Gulf of Mexico northwards past the Intracoastal Waterway to its head at Chattahoochee. This channel will eventually be deepened to 9 feet. Completion of the Jim Woodruff, Upper Columbia, and Fort Benning Dams will extend the 9-foot channel to Columbus on the Chattahoochee River and to beyond Bainbridge on the Flint River. These navigation facilities will be of great benefit to shippers, while the dams with their reservoirs will alleviate flood losses in that part of the country. Power plants will be built at three of the dams, having an initial capacity of 140,000 kw which can ultimately be increased to 237,000 kw. The estimated cost of the entire development at present-day prices is close to \$120,000,000.

Jim Woodruff Dam

The Jim Woodruff Dam lies just north of Chattahoochee, Fla., with the Georgia-Florida state line running across the axis of the dam. Chattahoochee is an important railroad junction served by four lines—the Louisville & Nashville, Atlantic Coast Line, Seaboard Air Line, and Apalachicola Northern. Spurs will no doubt be built from some of these lines when concrete construction is scheduled for future work on the dam structure and powerhouse. U. S. 90 crosses the Apalachicola River about 3,200 feet downstream from the site.

To retain the flow of water down the broad river valley, the new dam will have a length in excess of 6,000 feet. It will reach from a hill on the left bank at elevation 225, to a hill on the right bank having an elevation of 120. The earth overflow dike section now being built is 2,530 feet long, extending out from the left bank. The remainder of the dam, taken in order from the left to right bank, includes a transition



General perspective of the Woodruff Dam on the Apalachicola River in Florida.

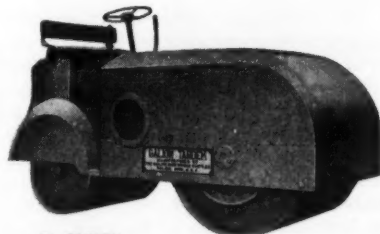
section to a switchyard and parking lot, powerhouse, gate-controlled spillway section, navigation lock, and a fixed-crest spillway section.

The earth overflow dike will be built to elevation 85; the present elevation

of the riverbed is around 41. The concrete portions of the structure are the 760-foot gate-controlled spillway with the top of the gates at elevation 78.5, and the 1,584-foot fixed or open-crest

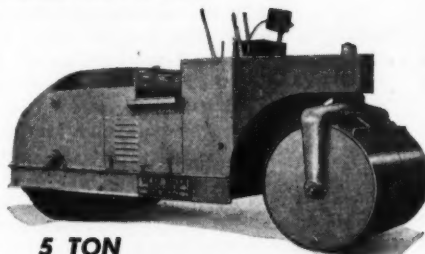
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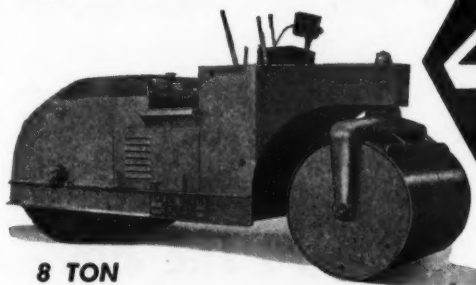
3 TON

Variable from 3 to 5 tons



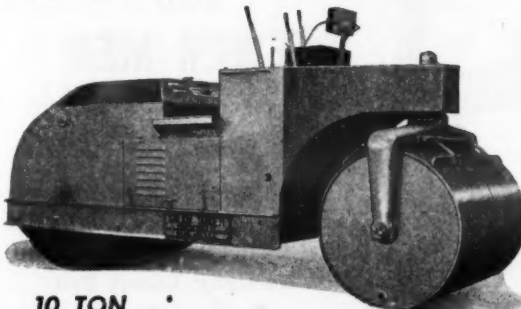
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Work Gets Under Way On Jim Woodruff Dam

(Continued from preceding page)

spillway, with crest at elevation 79. The 82 x 450-foot navigation lock with a maximum lift of 33 feet will also be of concrete, as will the 267 x 151½-foot powerhouse. The powerhouse will have three 10,000-kw units. A contract has already been awarded to the Newport News Shipbuilding & Dry Dock Co. of Newport News, Va., to supply three 14,000-hp turbines for \$1,399,389.

Eventually, a reservoir spread out over 37,500 acres will be formed behind the dam. It will have a pool elevation of 77, and 243 miles of shore line. At that elevation the volume in the pool will be 385,000 acre-feet of water. The reservoir will extend 52 miles up the Chattahoochee and 47 miles up the Flint. An area of 65,000 acres will be acquired to provide a fringe or border of land around the reservoir for flowage rights, part of which will be used for recreational purposes and for the preservation of wildlife. This strip will also be useful in case of flood. In the controlled spillway section will be sixteen gates, each measuring 40 x 30 feet 6 inches.

The head of water in the pool, which lies in three states—Georgia, Florida, and Alabama—will vary from less than 1 to 33 feet since the head-water elevation is 77 and the tail-water elevation is 44. Backwater could reduce the head essentially to zero. The minimum gross generating head is 15 feet and the maximum is 33 feet.

Estimates of material required for the structural portions of the dam include: 455,250 cubic yards of concrete; 9,854,400 pounds of reinforcing steel; 6,830,980 pounds of structural steel; 132,920 sacks of cement for pressure grouting; and 477,880 pounds of steel castings and forgings.

The dam site extends into three counties—Jackson and Gadsden in Florida, and Decatur County in Georgia. Its geographical location was the cause of some unusual situations and complications. One end of the dam is in the eastern time zone, while the other is on central time. While the eastern end is in Georgia, the land actually belongs to the State of Florida which bought it to expand some near-by hospital grounds. At the beginning of construction, difficulties were encountered in



C. & E. M. Photos

Looking west across the site of Jim Woodruff Dam (above) we see a Lorain 2-yard shovel working down in the core trench. The pervious material it is excavating was heaped up as a protecting dike during the high-water stage of the river. At right, two Sullivan H. S. 15 air drills up on the left bank drill 1½-inch grout holes through the soft lime rock.



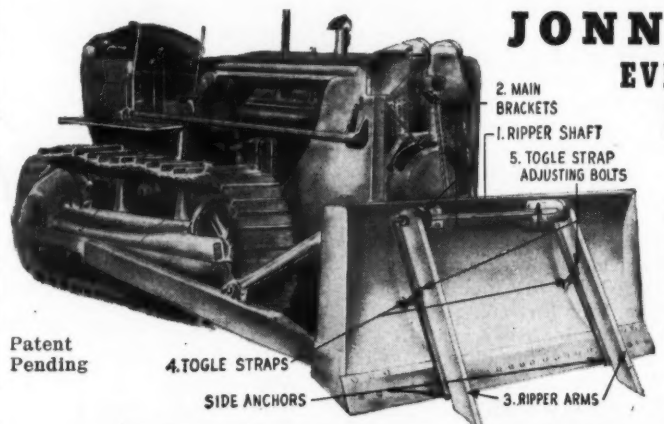
getting light, water, and telephone lines installed at the Corps of Engineers field office, since each of the adjoining states had different utility companies and their franchises did not permit them to cross a state line. The Engineers got out of this dilemma by installing their own lines across the state boundaries and tying in to the public utilities. The Engineers' field office at the eastern or left-bank side of the project is in Georgia, about ¼ mile from the Florida line.

Overflow-Dike Contract

The 2,530-foot earth overflow dike section under contract to W. C. Shepherd Co., Inc., involved placing 325,000 cubic yards of impervious borrow. But first a core trench was excavated to rock along the axis of the embankment. From 25 to 40 feet of overburden was removed to reach the rock which was scaled and smoothed off to an even surface. The bottom of the core trench is 14 feet wide with side slopes of 1½ to 1.

For a start in the core-trench excavation, a Lorain 820 dragline with a 75-foot boom and a 2-yard bucket was used. The excavated material was cast into a row alongside the trench to serve as a dike against high water when the river rose. When ground water was encountered at about elevation 56, a wellpoint system had to be installed, and the dragline method of excavation could no longer be employed because of the network of pipes in the

(Continued on next page)



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cut. A Lorain 82 shovel with a 2-yard bucket was then put in the hole for loading to a fleet of Euclids. The contractor had 5 end-dump and 6 bottom-dump Euclids holding an average of 15 and 18 yards respectively. Most of the core-trench excavation was removed by the bottom-dump Euclids.

The heavy rains of last winter and early spring made the wellpoint system a "must" because of the high ground water and the rising river. More trench wellpoint equipment was rented for this purpose, and at one time six More trench 8-inch vacuum pumps were working on the dewatering of the wet core-trench material. A total of 1,700 feet of 8-inch header line was strung out, usually about half-way up the slopes as they were excavated. As many as 340 2-inch-diameter wellpoints in 10, 20, and 25-foot lengths were hooked to the header line. The shorter lengths were generally installed at the toe of the slope on long offsets from the header pipe, while the longer wellpoints were sunk alongside the header half-way up the slope. The water was carried off in 1,500 feet of 8-inch discharge line.

At all times the level of the water in the river was higher than the bottom of the core trench. Last spring some boils bubbled up within the core trench, and often an individual pump was assigned the task of taking care of this troublesome source of unwanted water. Either one of the 8-inch wellpoint vacuum pumps was set to work pumping over the boil, or any of the contractor's half dozen other pumps was used. They were for the most part Jaegers, with from 3 to 6-inch-diameter intakes.

Lost Labor

Several hundred feet of core trench had been excavated down to rock last spring, when the project was particularly hard hit by the torrential downpours of March 31 and April 1. Within a 24-hour period 12 inches of rain fell. The shovel in the core trench was submerged nearly to the roof of the cab. And when the rain finally stopped and the water was pumped out, the once-excavated trench was filled with 3½ to 4 feet of silt that had been washed into the cut.

At the bottom of the trench a curtain wall of grout is being pumped into the rock for the length of the dike. This portion of the contract was sublet to the Jones Core Drilling Co. of Dallas, Texas. Holes 50 feet deep on 5-foot centers are drilled along the center line and then grouted in three stages. This seals up any cracks or crevices in the rock, and prevents any seepage or percolation of water under the earth dike. Drilling is done by three H. S. 15 Sullivan air drills, one Sullivan No. 12 gasoline drill, and one Ingersoll-Rand explorer air drill. A Jaeger 315-cfm compressor and an I-R 210-cfm compressor supply the compressed air. The grout holes are 1½ inches in diameter, and no difficulty has been experienced in drilling into the soft lime rock.

A grout mix varying from 2:1 to 0.6:1 is pumped into the holes from equipment set up at the top of the trench. Mixing is done in two 24-cubic-foot barrel-type mixers hooked up with an I-R agitator hold-over mixer for each unit. A Gardner-Denver pump

powered by the larger compressor pumps the grout into the holes. The contract estimate called for 30,000 linear feet of drilled grout holes, and 60,000 bags of cement for the curtain grouting, but an overrun of these quantities is expected.

Earth-Moving

After the grouting, the core trench will be backfilled with impervious material, which will be continued right up to build the dike. The impervious material, a plastic clayey sand, will be (Continued on next page)

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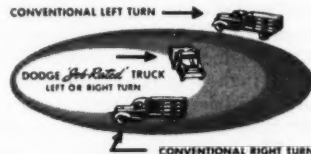
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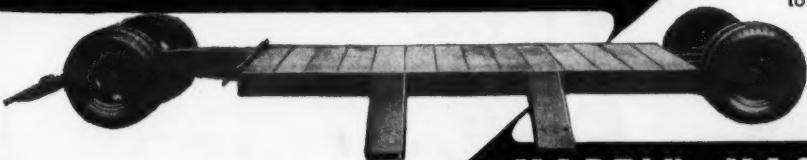


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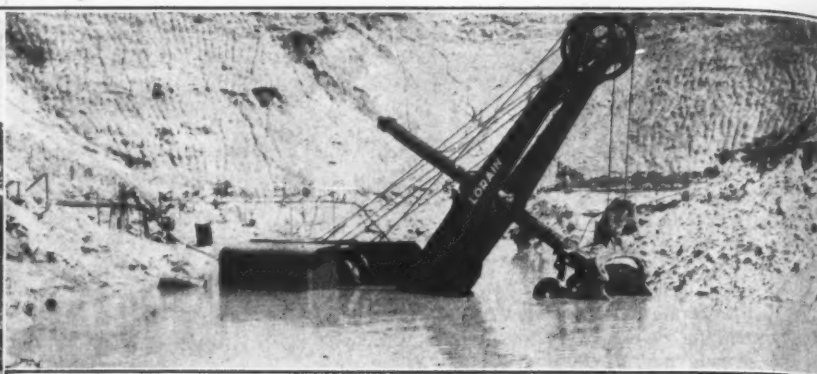
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C. & E. M. Photos

Heavy rains last winter and spring made it necessary to install the Moretrench wellpoint equipment shown at left, to dewater the core-trench material at the Jim Woodruff Dam. An 8-inch vacuum pump is up on the side of the hill and an 8-inch header line is half-way up the slope. The Lorain 2-yard shovel shown above was nearly submerged in the core trench when 12 inches of rain fell on March 31 and April 1.

Work Gets Under Way On Jim Woodruff Dam

(Continued from preceding page)

obtained from a borrow pit on top of the hill on the left bank of the dam site, requiring an average haul of $\frac{3}{4}$ mile. A haul road 30 feet wide has been constructed on a 7 per cent grade to wind down from the top of the hill to the core trench. Hauling will be done by the Euclids, mostly the bottom-dumps, loaded by the 2-yard Lorain shovel. Three Caterpillar tractor-dozers—two D8's and a D7—will work at either spreading the material in 9-inch layers or helping the shovel in the borrow pit.

The lifts are to be compacted to approximately 100 per cent maximum Proctor density at optimum moisture by a sheepsfoot roller, and shaped by a Caterpillar No. 12 power grader. A couple of tractor-scraper combinations will also be used in the dirt work, either stripping the borrow pit or handling short hauls around the core trench. They include two LeTourneau 13-yard scrapers pulled by D8 tractors.

The dike will be constructed to elevation 85 grade, with a 25-foot crown. Eventually an 18-foot paved road will be placed on the earth dike as an access road to the powerhouse, but the paving is not included in this contract. The side slopes are $2\frac{1}{2}$ to 1 and will be covered with a 6-inch layer of gravel topped by 18 inches of grouted riprap. The riprap will be obtained from a quarry near Sneads, 10 miles west of the dam site. The maximum width of the dike

through the bottom will be some 200 feet. It will consist almost entirely of impervious material except on the downstream side where some pervious material will be placed. The latter can

be obtained from the core-trench excavation or from the borrow area. The dike construction has been slowed by the early spring rains which made the ground too soggy for the earth-moving

equipment to operate.

Quantities and Personnel

Probably the next contracts to get (Concluded on next page)

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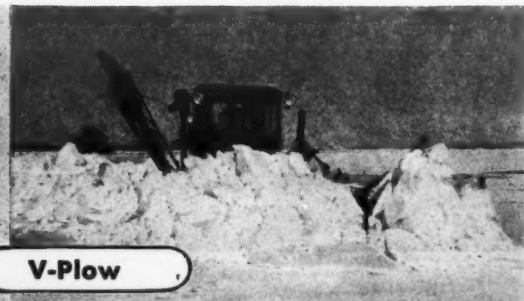
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under way on the project will include the construction of the navigation lock and the concrete open-crest spillway. This will of course depend upon the availability of funds for that purpose. While the Jim Woodruff Dam construction was approved by Congress in the River and Harbor Acts of March, 1945, and July, 1946, the first appropriation was for only \$1,010,000 as compared with the total cost of around \$42,000,000.

A force of about 50 employees is being used by W. C. Shepherd Co., Inc., on this first contract, under the supervision of C. K. Taylor, Superintendent. Herbert Shepherd is General Superintendent for the company of which W. Clyde Shepherd, Jr., is a member.

For the Corps of Engineers, Otto W. Tidwell is Resident Engineer and A. H. Feagin is Chief Inspector. Col. Mason J. Young, Division Engineer, heads the South Atlantic Division with headquarters at Atlanta. The Mobile District is headed by Col. Joseph J. Twitty, District Engineer.

The major construction items in the contract include the following:

Trench excavation	160,000 cu.yds.
Borrow, impervious material	325,000 cu.yds.
Rock excavation	7,000 cu.yds.
Riprap	21,000 cu.yds.

Data on Open-Web Joists For Building Floors, Roofs

An open-web joist for use in the construction of lightweight and fire-resistant floors and roofs is described in a 32-page catalog put out by the Concrete Steel Co., 2 Park Ave., New York 18, N.Y. The catalog covers the installation of the Consteel joists, features of design, and other pertinent data.

The bulletin describes construction details for the various types of anchors used with the Consteel joists, the bottom-chord extension, rigid and strut bridging, lath clips, screed chairs, headers, bearing plates, sag rods and plates, nailer joists, and twin-tee chord sections.

The final portion of the catalog tabulates data on the joists and their design, including: dimensions of the Consteel open-web standard joist; total safe loads uniformly distributed in pounds per square foot, designed to meet the Steel Joist Institute requirements; dimensions of the Consteel open-web nailer joists; and safe loads for the nailer joists.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 110.

Special Welding Rods

Two new welding rods for specialized service are announced by the Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y. The new Eutechchrom is described as a super-hard low-heat welding rod for use in overlaying worn or defective parts on machines and equipment. Its Frigidarc coating is designed to permit the use of the lowest possible current, in order to cut down on the heat required and minimize distortion, warping, and cracking. Eutechchrom 2 (ac or dc) is available in 1/4, 3/16, and 1/8-inch sizes and is said to leave a deposit with a Rockwell hardness of C62, or Brinell 650.

A small-diameter metal-cutting elec-



C. & E. M. Photo
Personnel on the Jim Woodruff Dam include Superintendent C. K. Taylor (left), Chief Inspector A. H. Feagin, General Superintendent Herbert Shepherd, W. Clyde Shepherd, Jr., and Resident Engineer Otto W. Tidwell.

trode for use with thin-sheet metals is also announced by Eutectic. The Cutt-rode can be used with small ac welding machines and can cut stainless steel,

bronze, nickel, or copper. Standard size is 3/32 inch. It is also made in a 1/8-inch size for medium-thick cutting, 3/16-inch for chamfering and cutting

heavy cast iron, and 1/4-inch for extremely heavy parts.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 98.

Circle-Drawing Aid

A plastic template for drawing circles is announced by Rapidesign, Inc., P. O. Box 592, Glendale, Calif. Circle diameters provided on the template range from 1/16 to 1 3/8 inches. In all, there are 39 sizes of circles.

The No. 40 circle template is made of 0.030 mathematical-quality cellulose-nitrate sheet. All circle cutouts are said to be precision-milled with allowance made for the pencil point. Each circle is clearly marked as to its diameter, and lines are set at 90-degree intervals as an aid to locating centers. Printing is on the reverse side to prevent wearing off. Size of the template is 4 x 7 1/4 inches.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 126.



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Convention Calendar

Oct. 19-20—Safety Congress

Construction Section meetings, National Safety Congress, National Safety Council, Hotel Stevens, Chicago, Ill. R. L. Moore, Senior Engineer, Construction Section, 20 N. Wacker Drive, Chicago 6, Ill.

Nov. 4-5—Southeastern Officials

Annual meeting, Southeastern Association of State Highway Officials, Edgewater Gulf Hotel, Edgewater Park, Miss. I. W. Brown, State Manager, Highway Planning Division, Mississippi State Highway Department, Jackson, Miss.

Nov. 18-20—Highway Conference

Virginia Highway Conference, Jackson Memorial Hall, Virginia Military Institute, Lexington, Va. R. P. Ellison, Executive Assistant, Virginia Department of Highways, Richmond, Va.

Dec. 7-10—Highway Research Board

Annual meeting, Highway Research Board, National Academy of Sciences and National Research Council Building, 2101 Constitution Ave., Washington, D. C. Roy W. Crum, Director, 2101 Constitution Ave., Washington 25, D. C.

Aims, Purposes of AGC Are Outlined in Booklet

The organization and work of the Associated General Contractors of America, Inc., is outlined in a 24-page booklet recently made available by the Association. The booklet lists the qualifications for memberships, the aims and purposes of the AGC, the various committees which it sponsors, and other general information.

It contains a brief description of the aims of the various AGC committees, and of the various trade associations with which the AGC has formed joint committees for solutions of mutual problems. It also contains a short history of the AGC and of the work it has accomplished in the past.

Copies of the booklet are available upon request by writing to the AGC national headquarters at 1227 Munsey Bldg., Washington 4, D. C.

Pre-Built Field Offices

A 6-page folder describing and illustrating the features of Steelox buildings has been made available by Armco Drainage & Metal Products, Inc., 703 Curtis St., Middletown, Ohio. These buildings are designed to serve as field offices, shops, and other facilities of a semi-permanent or permanent nature. They provide economies in construction and maintenance, and are readily adaptable in size and style to a variety of changing conditions, the manufacturer states.

The folder explains each of these features in detail, as well as several others such as fire and weather resistance. A series of five drawings shows how the Steelox buildings are erected; and a special insert pictures the way in which adjoining sections are inter-

laid. General data cover standard dimensions of height, width, and length; the types of windows and doors available; and also the features and styles

of the partitions, ceilings, louvres, and ridge ventilators. The folder also illustrates several different types of buildings which have been constructed with

the Steelox sections.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 36

4 BRAND NEW MICHIGAN TRUCK SHOVEL-CRANES... SERIES 8



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Here's a range of four completely new half-yard MICHIGANS designed to meet your particular job requirements. Your choice of single-engine power or twin-engine power, two-wheel drive or four-wheel drive. Remote control, which permits fast, easy maneuvering on the job, is available as optional equipment on the twin-engine models.

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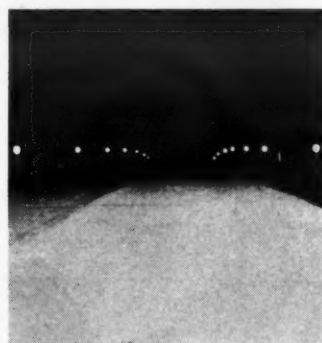
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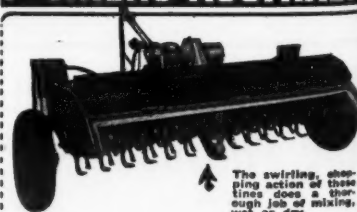
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CATAPHOTE Reflector Buttons and signs on the Pennsylvania Turnpike.

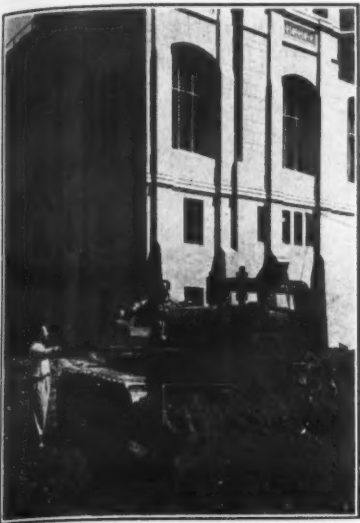
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FOR SECONDARY ROAD CONSTRUCTION... ARIENS AGGMIXER



HERE'S equipment designed especially for mixed-in-place construction—to operate in connection with other general purpose equipment. Whatever aggregates are used it thoroughly pulverizes, mixes and aerates aggregates with binder—rapidly and economically. Also ideal for soil cement stabilization. Safe, made 4 standard sizes, 4', 5', 6' and 7'. Write for details.

ARIENS COMPANY BRILLIANT WISCONSIN



Construction of a new addition to the 450-room Villa Riviera Hotel on Ocean Boulevard, Long Beach, Calif., called for moving some 50,000 yards of dirt. Here a new International TD-24 diesel crawler tractor—the first TD-24 in the Los Angeles area—is at work. Harry D. Hicks is the contractor.

system, the booster pump to speed the flow of water from tank to drum, the leakproof charging door, the truck-engine drive, and the Rex discharge-spouting arrangement. The catalog contains a series of job illustrations of the Rex Moto-Mixers and agitators in use, and a complete list of specifications.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 40.

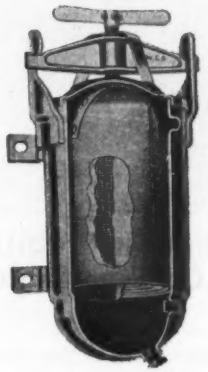
Detrex Enters New Fields

A complete line of cleaning equipment and chemicals for both production and maintenance cleaning are now being offered to the automotive and aviation service field by the Detrex Corp. of Detroit 32, Mich. The Detrex line includes solvent-vapor degreasers, parts washers, cleaning tanks, non-flammable degreasing solvents, alkali cleaning compounds, detergents, emulsion cleaners, paint strippers, spray-booth materials, masking compounds, and shampoo-type cleaners.

Get All the Lubrication Good Oil Provides!

WGB Clarification Assures Lower Lubrication Costs—Longer Engine Life

AND HERE'S WHY: Intensive laboratory tests prove that correctly processed, properly formed and adequately supported, fine cotton is the most efficient filtering medium for all kinds of oil. Further, WGB Clarification thoroughly cleans the oil—without removing essential additives or other lubricating qualities. The WGB Cartridge outlasts other types by a ratio of 2 to 3... cuts engine repairs to a new unheard-of low—and can be changed without tools! Get to know the advantages of WGB Clarification.



W. G. B. Oil Clarifier, Inc.

139 Cornell St.
Kingston, N. Y.

Self-Equalizing Brake For Electric Hoists

A new type of automatic self-equalizing motor brake for R & M electric hoists has been developed by the Hoist & Crane Division of Robbins & Myers, Inc., 1934 Clark Blvd., Springfield 99, Ohio. It is designed to improve hoist performance and speed up handling and spotting.

Magnetically released, the brake consists of a series of self-aligning circular friction disks, alternated with brake plates attached to the motor shaft. The mechanism is operated automatically by dual-voltage brake coils that correspond to those of the hoist motor; only a shift of motor connections is required should power-source voltage change. When power is switched off, or should power fail, this brake holds the load securely, the manufacturer points out. Brake adjustment is by means of a single external screw; there are no covers to remove.

Specific advantages claimed for the brake include larger friction areas, freedom from "drift", longer life, uniform wear, greater efficiency, smoother action, minimum maintenance. It is now standard equipment on all R & M push-button-type electric hoists in capacities of 250 to 10,000 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 112.

Mechanical Pencil Writes in 4 Colors

A mechanical pencil which features four leads in one case is manufactured by the Norma Pencil Corp., 137 W. 14th St., New York 11, N. Y. It holds black, red, blue, and green leads, each with its own knurled knob and color indicator on the case. Norma three-color models are also available for writing in black, red, and blue. Any standard leads can be used, but the company recommends its own especially.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 59.

Truck-Mixers, Agitators

A bulletin on the 1948 line of Moto-Mixers and agitators can be obtained from the Chain Belt Co., 1666 W. Bruce St., Milwaukee 4, Wis. Bulletin No. 48-9 features a description of the component parts of these horizontal truck-mixers. It shows sectional photographs of the chain drive, the transmission, the drum mounting, and the design of the drum and blades.

Also featured in the bulletin is a description of the Rex water-control

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C-647 and HF-747



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IN CANADA: CLECO PNEUMATIC TOOL COMPANY OF CANADA, LTD., 927 MILLWOOD ROAD, TORONTO (LEASIDE), ONTARIO
DISTRIBUTORS IN PRINCIPAL CITIES OF THE UNITED STATES AND THROUGHOUT THE WORLD



Asphalt Stabilization Of Fine Sand in West

(Continued from page 1)

grade under all this construction is native dune sand, graded, unwatered, and uncompacted except by the passage of heavy equipment.

All slopes are being protected from wind and water erosion by mats of hay, held down by small piles of sand. Unless this protection was given as soon as the slopes were built, the everlasting wind would eat the slopes away and drift the sand like snow down through the country.

It is a simple, sound, economical highway design that is calculated to serve the farmers and ranchers of this remote country well indeed—also the out-of-state traffic which uses this main traveled route to the Black Hills region of South Dakota.

Grading Progresses Fast

The 162,630 cubic yards of grading moved rapidly. The eight Caterpillar D8's with 15-yard LeTourneau Carryalls assigned to this work roughed in all the grading in only 3 weeks and 3 days,

working 18 hours a day. A detour was built just ahead of the main grading operation, several inches of clay added and road-mixed, and the surface was covered with 2 inches of pea gravel from the Middle Loup River to take traffic past the job while work was in progress on asphalt stabilization.

Asphalt-Stabilization Methods

The key to the entire asphalt-stabilization process, according to the engineers who work with it, is the filler content. The native dune sand has no stability. Fine filler material and the asphalt bitumen are what give it cohesion enough to stand up under traffic without raveling, breaking, or shoving.

Here is the way Missouri Valley Construction Co. and the state highway engineers went about the work.

1. Starting at the east end, the first section to be mixed was laid out for approximately a mile.

2. The sand grade was reshaped to final survey stakes by two motor graders on the job. Since the character of the sand varied somewhat as to fineness, tests were run on this section to determine the tonnage of filler material required. The per cent of fines on

At left, Resident Engineer Oliver Johnson and District Engineer Harold Eason inspect windrow of sand and fines just ahead of mixing on a Nebraska "sand-hill road". The following the asphalt distributor, a rubber-tired tractor pulling a double set of drums (center photo) turns the fresh asphalt into the material. Next a Caterpillar motor grader (above) turns the material aside in preparation for the next shot of asphalt.

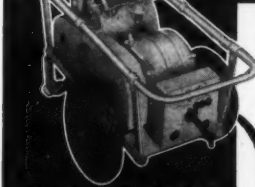
this job was 30 per cent of filler material passing the No. 200 mesh sieve, although from 25 to 30 per cent has been used in the past, depending on the sand to be stabilized. The coarser the sand, the more filler material

required.

3. A filler-material pit had been stripped from 12 to 36 inches deep by an Insley dragline, exposing a pocket of fine loess soil from 3 to 13 feet

(Continued on next page)

JACKSON MUNICIPAL PAVING UNIT JACKSON



Power plant furnished with unit: 1.25 KVA, generates both single and 3-phase 60 cycle AC. Also suitable for operating lights, vibrators, tools, etc.

TAKE THE FIRST STEP towards handling those municipal paving jobs with greater dispatch and efficiency. Write for the complete facts, NOW.

Places perfectly UPWARDS OF 65 Cu. Yds. of STIFF MIX concrete per hour

- Will undercut at the side forms; strike off to crown, both regular and inverted; roll back for second passes.
- Thoroughly vibrates concrete in slab depths up to 10" and is quickly adaptable to any slab width from 6' up to any practicable width.
- Works right up to and around sewers, manholes and other obstructions.
- Machine has strong tendency to propel itself in forward direction. Little effort required. Operators work from front, rear or sides.

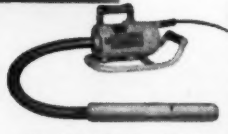
THE IDEAL VIBRATOR

FOR EVERY TYPE OF CONCRETE CONSTRUCTION

See them at your Jackson Distributor (name on request) or tell us the nature of the job and we will send descriptive literature describing the vibrator that will handle the job to best advantage.

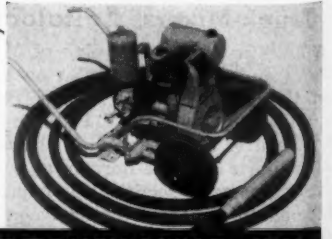


Model FS-6A. Flexible Shaft. Gas-engine drive. Available with 3 heads for thick or thin sections. Flexible shafting in 7' to 14' lengths up to 28", grinding and other attachments.



Model FS-7A. Flexible Shaft Electric. Ideal for decks, thin walls, and with short shafts for spud work.

Model HS-A4 Hydraulic — Gas Engine Driven. Highly reliable and efficient. Its 50 ft. reach saves many relocations.



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Marion "On the Job" Design CUTS COST ON LONG HAULS

Marion's field-experienced engineers have designed bigger pay loads into trailer dump units. These popular Marion dumps are available in all sizes, furnished with double arm and telescopic hoist. They are designed under actual work conditions to stand up under the toughest hauling and dumping jobs. For literature and prices, write direct or to your nearest Marion Distributor.



Standard 16 ft. trailer dump with HD-10 Hoist, designed for hauling coal, building material, gravel, crushed stone, etc.

MARION
DUMP BODIES and
HYDRAULIC HOISTS

MARION METAL
PRODUCTS CO.

MARION, OHIO

depth. This material in place carried about 16 per cent of moisture on the average.

A maximum of ten 5-yard dump trucks, loaded by the Insley ½-yard dragline, hauled the filler material out to the job. The pit was located about 2½ miles from the east end. As the trucks brought their loads out on the road, a spotter dumped them and carefully checked the calculated content at each station. In addition to the calculated material, about 10 per cent extra was allowed to compensate for the loss of fines that would blow away in the form of dust, or be washed away in rains.

4. A motor grader then windrowed the material in preparation for mixing.

5. The next operation consisted of a thorough pulverization of the dumped, windrowed filler material. Two Caterpillar motor graders road-mixed the material while two International-tractor-drawn Seaman Pulvi-Mixers interspersed their efforts with the graders'. The operation aerated the filler material, causing the loss of most of the moisture content. It also pulverized the fine soil to a point where 90 per cent would pass a No. 10 sieve. After it was pulverized to this extent, it was smoothed down by a pass of the graders.

6. An estimated 85 per cent of the total material required to make a 68-ton windrow per station was then cut out by the motor graders. This was one of the most important steps of all. Unless the content was judged quite accurately, there was a danger that too much sand might be picked up. When about 85 per cent was turned up, however, that left the other 15 per cent to be picked up in the mixing operation, or turned up by the wheels of equipment passing over the site.

The content of the windrow was then carefully checked for end area, to see that the right amount of material was cut out for the mixing work.

7. Two Caterpillar motor graders then worked with two Seaman Pulvi-Mixers, mixing and blending the fine filler material into the sand that had been cut out. The materials were mixed until they were thoroughly blended and showed no surface moisture.

8. Asphalt mixing then began. Using a 1,285-gallon Etnyre distributor with a 10-foot spray bar, the contractor applied SMC-3 asphalt to a 10-foot course at a temperature of about 180 degrees. One of the motor graders bladed a slice of the material out ahead of the distributor. During the 10 to 12 passes of this operation, from 0.9 to 1.0 gallon was applied per linear foot per pass.

A rubber-tired tractor, pulling a double set of disks, then passed over the fresh asphalt and turned it into the material laid down. Following this machine, the motor grader bladed another layer of dry material up, to be again shot with asphalt. This process was repeated until the total asphalt content of 5½ to 6 per cent by weight had been injected into the windrow. Total quantities of bitumen on this job figured 1,200 gallons per 100-foot station.

Asphalt cars were shipped in over the Burlington railroad and spotted on sidings at Halsey and Natick, near each end of the job. A Cleaver-Brooks booster was used at each siding to warm up the cars to the required application temperature.

9. The section was then turned over to the road-mixing machines, and the equipment moved on ahead to the next section.

10. Two Caterpillar motor graders and two other Seaman Pulvi-Mixers then moved in to mix the asphalt, sand, and filler material quite thoroughly. The Pulvi-Mixers made pass after pass through the windrow as the graders bladed it from side to side. They did not stop mixing and turning the material until the particles were all black

and the asphalt was evenly distributed. The material was then thrown into a windrow for the start of aeration.

11. Approximately 85 per cent of the volatile cut-back agent in the asphalt was allowed to evaporate over a period of days; a motor grader turned the windrow occasionally to expose as much of its surface as possible to the sun and wind. Air temperature, wind, and the amount of moisture in the material were all important factors to consider in the time of aeration. However, precise aeration tests were made in the field laboratory on the job by the state engineers, along with stability tests, so there was no guesswork in the matter of aeration.

In theory at least, a windrow should aerate properly in about 10 days of summer mixing. On a rather long job, however, where contractors are governed by the more practical economics of the situation, it is common practice to go ahead and mix as much of the material ahead as possible, and then

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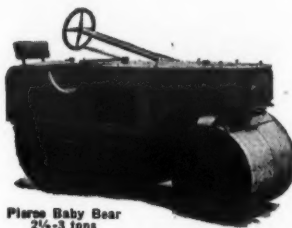
A Roller For Every Job

Sturdy, heavy-duty rollers, engineered to stand up under the toughest conditions. Pierce-Bear Tandem Rollers are powered by economical Allis-Chalmers 4-cylinder industrial type gasoline engines. Variable weights, from 3½ to 5 tons with built-in water tanks for ballast and wet rolling.



Pierce Medium Bear
3½-5 tons

The new 2½-3-ton Pierce Baby Bear is designed for close-in work and small area maintenance. It works against a curb up to 25 inches high and within 1½ inches of a higher wall or building. Final drive is within the rear roll. Use Pierce-Bear Tandem Rollers for all-around performance. Write for folder.



Pierce Baby Bear
2½-3 tons

Pierce-Bear Rollers
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THE MARION LINE
Shovels • Draglines • Clamshells • Cranes • Walking Draglines • Pull Shovels

TYPE	CAPACITY	TYPE	CAPACITY
33-M	¾ cu. yd.	4161	5 cu. yds.
362	1½ cu. yds.	151-M	6 cu. yds.
372	1¾ cu. yds.	5323	18 cu. yds.
*93-M	2½-3 cu. yds.	5561	40 cu. yds.
492	3 cu. yds.	**7200 Walker	5-7 cu. yds.
*111-M	3½-4 cu. yds.	**7400 Walker	8-12 cu. yds.
		**7800 Walker	30 cu. yds.

*Diesel Clutch type and Ward-Leonard electric. **Size of bucket depends on length of boom.

From 3 cu. yd.
to 40 cu. yd.
MARION
POWER SHOVEL COMPANY
SINCE 1884

MARION
POWER SHOVEL COMPANY

MARION, OHIO, U. S. A.

Offices and Warehouses in all Principal Cities



C. & E. M. Photos
First photo: Resident Engineer Oliver Johnson, General Superintendent L. J. Koenig, and District Engineer Harold Easom, on the Nebraska Highway 2 job. In the second photo, workers spread hay mulch on a fill. The photo above gives an idea of the road's riding qualities.

Asphalt Stabilization Of Fine Sand in West

(Continued from preceding page)

concentrate the machines on laydown work later. That was done on this job, and from 4 to 8 weeks elapsed on some of the sections from the time of mixing to the time of laydown.

12. Laying the stabilized material was the next step. About 20 per cent of the material was left in place, with the remainder bladed to a windrow on one side of the road. The 20 per cent was bladed, shaped, and crowned. Two Bros pneumatic-tire rollers then made several passes over the shaped material.

State specifications make it mandatory that the other part of the windrow be moved completely across the road in laying the material down in place. With the windrow on one side of the road, then, the graders cut out about 3 inches of material and laid it down on the opposite side. The pneumatic rollers again worked on this material.

The remainder of the windrow was then bladed over on top of the compacted material, and a 3-inch lift cut out and laid over the second half of the road. This material was also pneumatic-rolled by about seven or eight passes.

The remaining stabilized material was then carefully drifted over the roadway, and shaped and crowned to conform to finished lines before it was pneumatic-rolled. After the densities were obtained by pneumatic rolling, a 10-ton Austin-Western tandem smooth-wheel roller moved in and put the final surface on

the material. Two complete passes were made by the big smooth roller.

This completed the mile-long section of stabilized road.

Armor-Coat Work

To protect the stabilized material from the abrasion and ravages of traffic, a thin armor coat was then laid over the bituminous-sand mat. This consisted of a 0.25-gallon application per square yard of RC-3 asphalt, followed by a layer of $\frac{3}{8}$ -inch maximum washed sand-gravel cover aggregate applied by spreader box on the back of a truck. The cover material was laid at the rate of 20 pounds per square yard and rolled by the smooth roller.

Specifications called for the cover or armor coat to be rolled and broomed for a 3-day period. At the end of that time the road was smooth, skidproof, and durable.

The major quantities of material in the bituminous part of this job consisted of 8,970 cubic yards of mineral filler, 412,860 gallons of SMC-3 asphaltic oil, and a unit item for manipulation of the material per station.

Erosion Protection

To protect the new slopes from devastating erosion in rain and wind, about 126,000 square yards of hay-and-sand mulch were laid. The hay was purchased and baled near North Platte and hauled to the job. A labor crew opened the bales and spread the hay over the slopes with pitchforks, weighting it down every 2 or 3 feet with piles of sand and earth. The first rains tend to work the hay down in the sand.

No seeding was done, but the slopes will probably start a good stand of rye and other prairie grasses, since that form of cover material is native to the region. This growth will appear by the time the hay has decomposed.

Good workmanship, good progress, and good methods were the main characteristics of this small but important job. Soon, known by its Federal-Aid number F-281 (12), the section will go
(Concluded on next page)





are built with MORE than QUALITY MATERIALS

Pictured here is the Rogers Type D, eight rear wheel, two-way oscillating axle trailer. This trailer readily conforms to roadbed irregularities. Eliminates any tendency toward deck weaving or distortion.



Rogers time-tested and universally approved trailers for heavy and unusual hauling, are all products of exceptional engineering skill, acquired over a period of more than 32 years.

Progressive evolution has produced a complete line of trailers UNCOMMONLY STRONG but COMPARATIVELY LIGHT. They may be loaded easier and moved through traffic with greater speed and safety. They render exceptionally long periods of service with remarkable freedom from repair expense. AN IMPRESSIVE RECORD OF REPEAT ORDERS stands as convincing evidence of Rogers long and continued acceptance.




Shown above and at right are two views of the Rogers Walking Beam Trailer. Side swinging brackets permit operation with 8 or 10 ft. deck widths to conform to certain state requirements.



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DESIGNERS and BUILDERS OF
HEAVY DUTY TRAILERS
SINCE 1915

EXPERIENCE builds 'em PERFORMANCE sells 'em

108 ORCHARD ST. ALBION, PENNA.



Now—one man can cut concrete 3 to 5 times faster with the

Backlin Stratedge CONCRETE CUTTER

The Backlin STRATEDGE concrete cutter cuts fast... up to 60" per minute... straight and clean, leaving sharp, straight edges and 90° corners. Depth of cut can be regulated from 1" to 3". A 6-hp. engine drives the specially designed diamond saw.

The STRATEDGE cutter will cut or score concrete, asphalt, marble, tile or terrazo. Used on large or small jobs by contractors, highway crews and municipalities.

A self-contained unit, STRATEDGE requires only one man for operation. Easy handling, powerful performance with minimum vibration, makes it efficient for large scoring or cutting jobs. Lightweight, simple transportation, makes STRATEDGE economical for small, scattered jobs.

WRITE FOR FOLDER GIVING FULL DETAILS

Backlin

PRODUCTS CO.

Burlington, Wisconsin

in service to improve the all-important state route which lies about half-way between transcontinental east-west routes 20 and 30.

Personnel

The Missouri Valley Construction Co. is headed by its President, Peter Kiewit of Omaha. Field supervision was under the direction of L. J. Koenig. Koenig was also the General Superintendent of another small Missouri Valley job west of Thedford, where more work was done this past summer.

The sand-hills project was designed and supervised for the State under the general direction of F. H. Klietsch, State Engineer, and Art Bohner, Construction Engineer, with Harold Easom as District Engineer at North Platte and Oliver Johnson in charge on the job as Resident Engineer. Bituminous research and tests in Nebraska are under the supervision of George Swatek, Materials Engineer, and R. E. Bollen, Testing Engineer, at Lincoln.

Lightweight Barrow

A lightweight wheelbarrow of $3\frac{1}{2}$ -cubic-foot capacity has been added to the line of mixer products put out by Vanco Products, Inc., 130 S. Weber St., Colorado Springs, Colo. The body is made of heavy-gage steel with all four corners overlapping and welded to provide a double thickness.

The new barrow is equipped with a 4:00 x 8:00 pneumatic tire for easy rolling. Selected-wood handles are bolted to the tray, and an extra-heavy dump-bar extends in front of the wheel to facilitate dumping the load.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 58.

New Hose Coupling

A hose-line coupling designed to permit separation of hydraulically controlled farm equipment without loss of hydraulic fluid is made by the Aeroquip Corp., 303 S. East Ave., Jackson, Mich. A feature the company cites for the Breakaway coupling is that it automatically disengages when a pull of 60 pounds is exerted on the connecting hose; thus the danger of breaking the line itself is eliminated. The coupling can also be disconnected by manually tripping a trigger mechanism.

The Aeroquip coupling consists of two

self-sealing units held in position by a mechanical latch. When uncoupled, each half will automatically seal itself, the manufacturer states, to prevent dirt or air from entering the system and the hydraulic fluid from leaking out. It can be used with single or double-line hydraulic systems, and is designed for operating pressures of up to 1,250 psi.

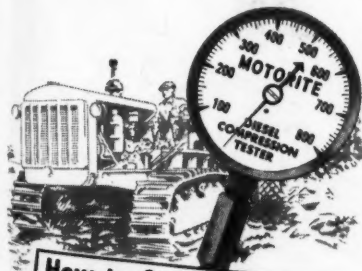
Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 72.

Ex-LeTourneau Official Dies

Denn M. Burgess, former Executive Vice President and Manager of R. G. LeTourneau, Inc., died recently at his home at Lafayette, Calif. Mr. Burgess started with LeTourneau in 1931 as a district representative and Eastern Sales Manager, becoming General Manager in 1938. He was appointed a Vice President of the company in August, 1939, and retired from business in February, 1946. He was 57 at the time of his death.



This Lorain 820 equipped with a $2\frac{1}{4}$ -yard dragline bucket handled 535,000 cubic yards during ditching operations for the Nebraska Tri-County Irrigation District. The ditch pictured here is 8 to 18 feet deep and has an 8-foot bottom. It is located near Lexington, Nebr. Contractor on the job was the Cass Co. of Ogallala, Nebr.



How to Stop DIESEL TROUBLES Before They Start

The compression-ignition principle of Diesel engines makes regular checks of compression of all cylinders vitally important. Maintaining correct compression pays off. It means keeping your Diesels running at peak efficiency. The result is greater operating efficiency, longer engine life, and lower maintenance costs.

The MOTORITE Diesel Compression Tester simplifies checking compression pressure. It is easily interchangeable to any make of Diesel by means of an fuel injector. In addition to a "universal" adapter which serves more than 50 makes and types of Diesels, we have a complete line of special adapters for practically every commonly-used Diesel.

For full particulars write for leaflet 605.

ATTENTION Distributors: Diesel equipment and accessory jobbers are invited to write for information about attractive distribution proposition.

BACHARACH INDUSTRIAL INSTRUMENT CO.
7000 Bennett Street - Pittsburgh 8, Pa.

The Eaton Planetary System Minimizes the Load on Each Gear Tooth with Resultant Longer Life

In Eaton's exclusive planetary system, the gear load is divided over four planetary pinions. Hence, the pound load per inch of gear tooth face is relatively low, and possibility of fracture under severe service conditions is minimized. This feature contributes to the long life of Eaton 2-Speed Axles.

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Roadside Conference Held in New England

Current problems confronting roadside engineers in the northeastern section of the country, and ways in which some of them are being solved, were discussed recently at the first roadside-development conference in Division 1 since the war. This regional conference was sponsored by the Coordinating Committee of the Highway Research Board and the American Association of State Highway Officials. Representatives from Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and the Public Roads Administration, attended the two-day sessions in Boston, Mass. They were presided over by John S. McManmon, Landscape Engineer, Massachusetts Department of Public Works, and Coordinator for Division 1. The informal discussion of roadside problems which these states have in common led to a valuable exchange of ideas and experience.

A serious problem in that section of the country right now is the Dutch elm disease which is reaching alarming proportions. Many hundreds of trees have had to be cut down because of it, and it is becoming a serious drain on highway funds. The best way to combat the disease, it was suggested, is (1) to keep trees healthy by proper sanitation and feeding, and (2) to spray the trees when the beetles are emerging. Mist-spraying has been used with considerable success. Another necessary precaution to prevent the spread of the disease is to burn all infected elm wood which is cut, or strip the bark.

Massachusetts has formed a committee composed of representatives of Massachusetts University and the State Department of Agriculture and Conservation, Dr. Donald Wyman of the Arnold Arboretum, and others, to study the problem and advise on suitable methods of ridding the state of this pest.

Second in importance seemed to be the problem of preventing tree damage as a result of line clearance by utility companies. Although the greater right-of-way being taken for new highways should eliminate this difficulty on some of the roadsides in the future, former poor land use has created this problem on many of the present highways and will continue to do so.

It was suggested that the Highway Research Board Right-of-Way Committee be asked to study the legal phases of the utility-line problem and report on it. In the meantime, it was agreed that (1) it is desirable to work towards joint line clearance by the various utility companies using the roadsides; (2) clear concise regulations as to proper clearance procedure should be

given to the utility companies; and (3) proper inspection of the work must be maintained.

Other subjects discussed included some of the factors in highway contract work, such as specifications on dates for seeding (which may hold the contract open and increase job costs); whether to specify the end result or the procedure; to mulch or not to mulch, and when and where; a separate seeding contract vs. seeding included in the highway contract. While actual procedure in these matters seems to vary greatly according to each state's overall roadside program and policies, it was agreed that two objectives must determine the decisions: prompt action to prevent erosion; and economy in accomplishing the desired results.

Possible subjects for study by the Highway Research Board Roadside Development Committee were taken up, and it was agreed that the personnel and administrative problem is an important one for further study. The present lack of uniformity in titles, qualifications for various grades of professional landscape personnel, and comparable status of highway-department landscape engineers, is a detriment to the prestige and effectiveness of the profession as a whole, it was pointed out.

It was further agreed that there is need for a roadside-development manual to contain the following types of material: (1) a general non-technical introduction to roadside development, discussing such topics as administrative objectives, etc.; (2) a section on specifications, outlining the various phases of the work and the way it should be done; and (3) details on how to carry out the various phases of the work, which could be used for personnel training and supervisory guidance. It was suggested that such a manual should be prepared to cover the overall problems for the entire country, and then sent to the various divisions for comment and criticism, and for supplementary material to meet the needs of each division.

Such a project should carry still further the objectives of meetings like this Division 1 regional conference—of sharing experience and knowledge in order to make the roadside-development program contribute the maximum to highway-maintenance economy, and to safety and convenience for the traveling public.

Sabine Joins Byers Co.

Kenneth E. Sabine has joined The Byers Machine Co. of Ravenna, Ohio. He holds the position of Assistant Sales Manager in charge of advertising and sales promotion.

Breakers and Other Tools

A folder listing the Vulcan line of tools for pavement breaking, rock drilling, and clay digging has been prepared by the Vulcan Tool Mfg. Co., 41 Liberty St., Quincy 69, Mass. These are made in a wide range of styles and sizes.

Among the items listed in the folder are moil points, narrow chisel bits and 3-inch chisel bits in standard and super-service models, asphalt cutters, clay spades, frost wedges, digging chisels, square and round dirt tampers, and sheathing drivers. The clay-digging

tools supplied by Vulcan include a clay digger and chisel blank, clay spade or scoop, and a flat pick. Rock-drill steels are also listed in the folder.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 79.

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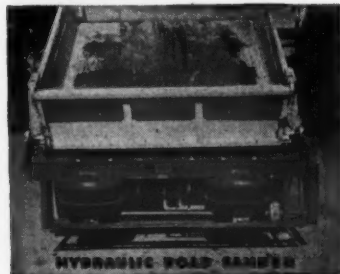
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Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Federal Eight-Hour Law

Applied to Foreign Job

THE PROBLEM: An American citizen was employed by a Government contractor on military construction work abroad. Was he entitled to overtime pay, either under the Federal Eight-Hour Law or as beneficiary of a clause in the construction contract, which required the contractor to obey all applicable Federal laws?

THE ANSWER: Yes, decided the New York Court of Appeals. (*Filardo v. Foley Bros., Inc.*, 78 N.E. 2d 480.) The court reversed a judgment of a lower court (272 App. Div. 446, 71 N.Y. Supp. 2d 592) dismissing the employee's suit.

The Court of Appeals read together the contract clause already mentioned with the provisions of the Eight-Hour Law, and concluded: "While the statute does not in so many words grant to the employee a cause of action if such compensation is not received, it is settled that such remedial legislation is to be given a liberal construction to effectuate its purpose. . . . The statute . . . provides that overtime work was to be permitted 'upon compensation' at not less than time and one-half for such overtime work. . . . Manifestly, that language must be read as an affirmative direction that compensation for overtime work shall be paid and may be collected. . . . With the beneficial purposes of the statute so manifest, if plaintiff may not sue to enforce it, the benefits accorded would indeed be empty and illusory. . . .

"Nor do we deem it of controlling significance that this statute is silent, while another, the Fair Labor Standards Act, . . . is explicit in declaring that employers who violate that act . . . shall be civilly liable to the injured employees. That act entitles the employee not only to damages suffered—the specified minimum wage or overtime pay—but also to an additional sum as liquidate damages. Obviously, in such a case, the employee would be in no position to claim such double damages without explicit statutory authorization."

The Court continued: "The fact that plaintiff worked abroad presents no obstacle to his recovery. The Eight-Hour Law involves a subject matter in which the United States is vitally concerned—work standards on its own public works and projects. Unquestionably, Congress had the power in such cases to prescribe hours of work and rates of pay and to insist that such standards be observed, regardless of where the work is to be performed."

Intimating that the act might apply to foreign labor hired abroad, the Court of Appeals added: "Insofar as the civil aspects of the statute are concerned—and we consider no other—it clearly applies to such work, at least when performed by United States citizens under a contract of employment entered into in this country; and, so applied, we see no constitutional objection to its enforcement. In much the same manner, obligations imposed by the workmen's compensation and liability insurance laws of one state are held enforceable even though the accident occurs in another state."

The court concluded that, apart from the right to sue given by the statutory provisions above mentioned, "plaintiff clearly has a right to sue on the basis of the contract between defendants [the contractors] and the Federal government. By principals of general contract law—here controlling since we are concerned with the construction of a contract of the Federal government—as well as by the law of New York, suit on a contract may be maintained by a third-party beneficiary." Here the court refers to the general rule of law that where any contract has been entered into between two parties for the benefit of a third, the latter is entitled to enforce a right to the benefits, although he is not a party to the contract and the agreement does not specify that he shall be entitled to sue.

No Extra Pay for Repairing Washed-Out Embankment

THE PROBLEM: A contract required building of 5.63 miles of highway along a river in mountainous New York terrain. When work was suspended for the winter on November 1, unclassified excavation was 87 per cent complete and the entire job 77 per cent finished. March floods entailed repair of the road embankment and re-excavation of the river channel. The state engineer ruled that the contractor was bound to do that work at his own expense. The contractor refused to do so. The contract was ultimately canceled by the State and the work was re-let to another contractor. Was the contractor's assignee entitled to collect damages on a theory that the State broke the contract?

THE ANSWER: No, decided the New York

Court of Claims. (*Michael v. State*, 79 N.Y. Supp. 2d 107.)

After considering all the facts of the case, the Court of Claims concluded: Claimant failed to show that faulty state plans covering the road embankment made the repair work necessary. The contractor was not justified in refusing to proceed, and was financially unable to do so.

"The work of restoring the roadway and re-excavating the channel was slight in relation to the whole contract and in relation, also, to the work already performed. . . . Here was an honest dispute. It cannot be said that what the engineer required was so palpably . . . beyond the provisions of the contract that the contractor was justified in refusing to obey." If the contractor "had adopted the construction of the contract placed upon it by the State's engineer and had proceeded to do the work, under protest, that corporation would not have lost its

(Concluded on next page)

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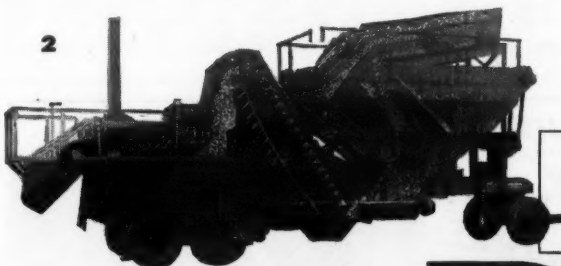
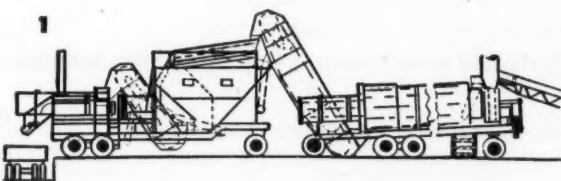
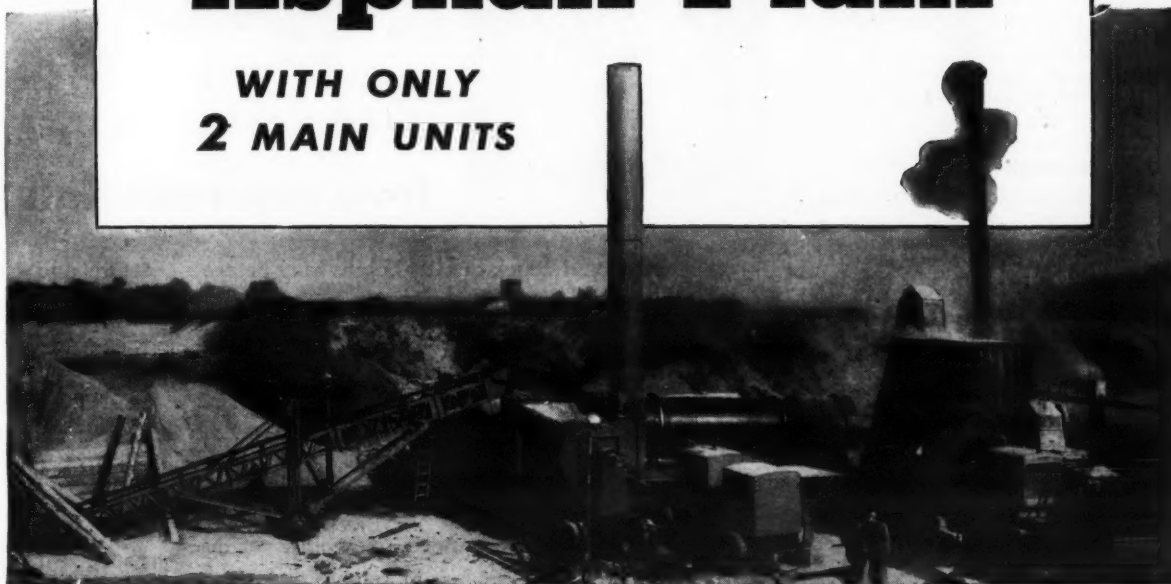
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Avoid Legal Pitfalls

(Continued from preceding page)

right to subsequently justify its position." The evidence showed that the contractor was insolvent when the State terminated the contract, but it did not appear that the State's representatives were aware of that fact. The Court of Claims said: "Insolvency, in and of itself, is not equivalent to a breach of contract. . . . And it does not relieve the other party from performance. . . . Mere doubt as to the contractor's insolvency would not have justified cancellation of the contract. . . . Nevertheless, the burden is upon this claimant, who seeks to maintain an action for the breach, to establish that" the contractor "was ready, able and willing to perform. . . . We find as a fact that" the contractor "was not in that position of readiness."

Injured Employee's Duty To Submit to Operation

THE PROBLEM: A contractor's employee was totally disabled for work through accidental fracture of his heel in the course of his job. But the disability could be reduced to 25 per cent by an operation that would not entail serious suffering or risk. Could an award for total disability be reduced when the employee refused to submit to the operation?

THE ANSWER: Yes, decided the New Mexico Supreme Court. (Fowler v. W. G. Construction Co., 188 Pac. 2d 160.)

The court noted that, as a general rule, "an injured workman will be denied compensation for an incapacity which may be removed or modified by an operation of a simple character, not involving serious suffering or danger. A refusal to undergo an operation under such circumstances is regarded as unreasonable. . . . On the other hand, if the operation be of a major character and attended with serious risk to life or member, the rule is that an injured employee's refusal to submit to such operation is deemed not unreasonable, and compensation should not be denied on that account."

Void Drainage Work Held To Be Illegal Trespassing

THE PROBLEM: Proceedings to establish a drainage ditch did not conform to statutory requirements. Could the contractor therefore be held liable as a trespasser in excavating on private land?

THE ANSWER: Yes. (Walters v. Chamberlain, 65 Mich. 333, 32 N. W. 440, decided by the Michigan Supreme Court.)

The landowner sued for damages which she claimed resulted from ditching done on her land. And it appeared that the proceedings to establish a drain were void because they were not according to legal requirements which governed institution of such proceedings.

The Supreme Court said: "The proceedings of the commissioner being void, no right could accrue to any party thereunder; and if the plaintiff, either by herself or by her agent, was present while the proceedings were being had before the commissioner or commissions, and did not object thereto, it would make no difference. It is more than an irregularity that is complained of. It is the invalidity of what was done that is found by the court; and, so long as she objected to the defendant's digging the ditch, he could not go upon the premises for that purpose."

Work Shown by Plans Held To Be Part of a Contract

THE PROBLEM: A construction contract specified that the work consisted of grading and draining a section of highway. It did not mention excavation for a temporary connection between the highway and another road. But the contract did recite that the plans and

specifications were a part of it, and the spec provided that the plans should be a part of them. The plans did indicate the temporary connection with some particularity.

The contractor excavated for the connection, protesting that it was not part of his contract and claiming the right to be paid at a higher price than that paid under provision in the contract for "unclassified excavation" (defined in the spec as including all materials other than water). Was the con-

tractor entitled to extra compensation, on a theory that the excavation was not a part of his contract?

THE ANSWER: No, decided the Connecticut Supreme Court of Errors. (John Arborio, Inc. v. Cox, 59 Atl. 2d 296.)

The court aligned itself with many other courts in concluding that when contract documents are so blended as above indicated, all of them must be examined in determining the scope of work to be performed.

Extra Grading Pay Item

THE PROBLEM: A highway contractor was paid on a unit basis. Was he entitled to pay, as an extra, for the cost of bringing the road to proper level when the engineers erred in setting grade level stakes?

THE ANSWER: Yes, decided the United States Court of Claims. (First-Citizens Bank & Trust Co. v. United States, 76 Fed. Supp. 250.)



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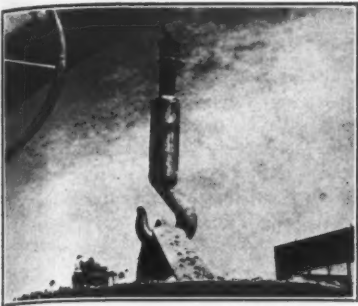
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A Miller whip-line swivel holds a heavy bucket in position and prevents twisting and unlaying in the wire rope suspending it. These annular ball-bearing swivels come in ten styles and in sizes to match standard wire-rope diameters.

Free-Turning Swivel

A free-turning swivel to prevent twisting and unlaying in wire rope has been developed by the General Machine & Welding Works, 1100 E. 2nd St., Pomona, Calif. The Miller annular ball-bearing swivels are precision-machined from high-strength steel and are made in sizes to match standard diameters of wire rope. They are available in ten different styles, such as hook and clevis, clevis and eye, swedge and stud, etc.

Three ball-bearing races are said to provide an effective freely rolling surface which enables the swivel to carry the maximum load for the smallest diameter and length possible. The manufacturer claims that under a load as high as 77,000 pounds, the Miller swivel can be freely turned with a torque as small as that produced by a slight wrist action.

The Miller swivels are cadmium-plated to prevent rust and deterioration, and the swivel bearings are protected from dirt and water by a life-time grease packing. The Miller whip-line model has a weight of 32 pounds; this is sufficient to return the whip line to the ground without a load, even when using long booms, the manufacturer explains. The unit is constructed with two female ends to permit flexibility in its use.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 78.

Gravel-Plant Operation

A 12-page catalog which explains the principle of bottom-deck feed as applied to duplex crushing and screening plants is available from Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn. It is designed to set forth, clearly and with illustrations, the fundamentals of successful and profitable operation of portable gravel plants.

The booklet describes how bottom-deck feed overcomes certain bottlenecks in the operation of gravel plants. It explains how screen operation is improved and how the crusher is kept operating at its maximum capacity.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 32.

Tools for Saw Sharpening

Sixty pages of practical information on equipment and methods for sharpening saws has been issued by E. C. Atkins & Co., 402 S. Illinois St., Indianapolis 9,

Ind. This booklet covers the use and care of large and small circular saws, wide and narrow band saws, and other types.

The catalog describes the Atkins line of filing-room tools, illustrates their manner of application, and lists the features claimed for them by the manufacturer. It also contains four illustrated pages on the procedure to follow in welding band saws.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 8.

Tandem Dump Trailer

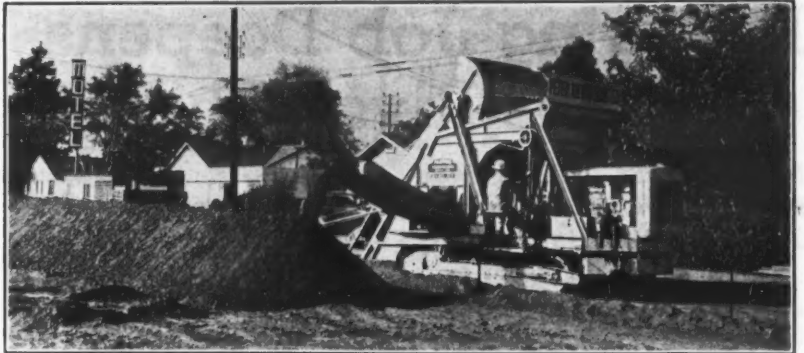
A tandem-axle dump trailer is manufactured by the McCabe-Powers Auto Body Co., 5900 N. Broadway, St. Louis 15, Mo. Made of United States Steel Co.'s Cor-ten steel, it features light weight combined with large capacity and high strength. The Model P-20 trailer has a 25-cubic-yard level capacity and measures 20 feet long x 5 feet high. It has a dumping angle of

45 degrees.

The Powers trailer is equipped with a Gar Wood Model D-88 hydraulically operated twin hoist, and Bendix-Westinghouse air-actuated brake boosters and slack adjusters. The cam-operated brakes measure 16½ x 6 x ¾ inch. The trailer has twelve 10:00 x 20 12-ply

tires, and a 33-inch interchangeable lower fifth wheel. According to the manufacturer, 34 per cent of the payload is distributed on the king pin, and 66 per cent on the tandem-axle unit.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 60.



A Parsons 310 ditcher powered by a Caterpillar D8800 diesel digs a trench 13 feet deep by 24 inches wide for a concrete storm drain pipe to serve the Cahuenga Freeway in North Hollywood, Calif. The contractor is Peter Kiewit Sons' Co. of Omaha.



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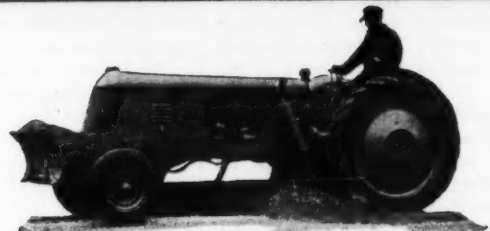


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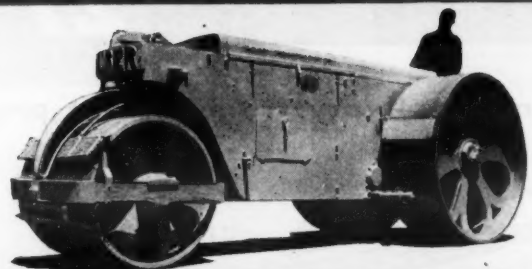
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Dredging Job Deepens, Widens River Channel

A Part of St. Johns River, Fla., Improvement Project; Jacksonville District Has Large Dredging Program

★ THE Jacksonville, Fla., District of the U. S. Corps of Engineers has a large-scale dredging program under way to improve rivers and harbors. In addition to projects now active, some items have been completed, while others are scheduled for the immediate future. One of the largest single jobs, both from the yardage involved and the cost, is the dredging of Terminal Channel in the St. Johns River near Jacksonville in the northeast corner of Florida.

For a distance of 4½ miles, the Arundel Corp. of Baltimore, Md., has been widening and deepening Terminal Channel by removing about 3,500,000 cubic yards of material. The enlarged section will have a minimum width of 590 feet, and a depth of 34 feet. This contract started in July, 1947, and was to be completed this past summer; estimated cost, \$1,290,000. The improvement to this section is part of the overall program to enlarge 26 miles of channel in the St. Johns River from Jacksonville to the Atlantic Ocean.

This contract began just downstream from Jacksonville near Commodore Point. It extended in the direction of the ocean along Terminal Channel which is in close to the left bank of the broad river. It also included a section of the adjoining Long Branch Cut. Prior to this improvement, the channel was 400 feet wide and 30 feet deep. To add the 190 feet of extra width, a virgin cut was made, deepening the river from 12 to as much as 36 feet. For while the project depth is 34 feet, the contractor had to guarantee a 1-foot overcut to 35 feet, and was also allowed an additional 1 foot down to 36 feet for which he was paid.

Terminal Channel is practically straight to its lower end where it bends to join Long Branch Cut. At the turns, the channel is widened beyond the 590-foot minimum. When we speak of the "lower" end of the contract, we mean

the northern end, for at this point the St. Johns flows about due north. Except for the last 18-mile stretch, which flows east to the Atlantic, the St. Johns flows north through Florida for its entire distance of 250 miles.

Hard and Soft Material

This project was far from a routine or run-of-the-mill dredging job. Limestone rock in the river bottom made digging difficult and retarded progress. When the project was first set up, the quantities included about 80 per cent soft material—silt, sand, and mud—and 20 per cent rock, or approximately 2,660,000 and 657,700 cubic yards of the soft and hard materials respectively. Later a supplemental 32,000 yards was added to the contract, consisting mostly of rock.

At the beginning of the job the Arundel Corp. used the 16-inch hydraulic dredge Hallandale for pumping the soft material. But later it brought in the Admiral, a much larger and more powerful dredge with a 26-inch pump, which did the bulk of the work. The ladder-type dredge Corozal was used in the rock excavation in conjunction with drill boats. From the latter, holes were drilled in the rocky bed of the river after the overburden had been removed by the suction dredge. These holes were charged with dynamite and blasted, and then the rock was dug out by the Corozal.

Spoil areas for the disposal of dredged material were furnished free to the Government by local interests which were represented by the Jacksonville Chamber of Commerce. The C. of C. has also acquired other spoil areas to take care of future dredging projects in the river.

Rock Work

A drill boat consisted of a steel barge, 35 x 45 feet, with two steel 45-foot masts set up at the bow, one in the port and the other in the starboard corner. Hung in each mast was an Ingersoll-Rand X-71 air hammer which drove the drill steel into the rock. The hammers were powered by a battery of three 315-cfm air compressors enclosed with-

in a deck housing at the stern. Two of the compressors were Gardner-Denver and the third was a Davey.

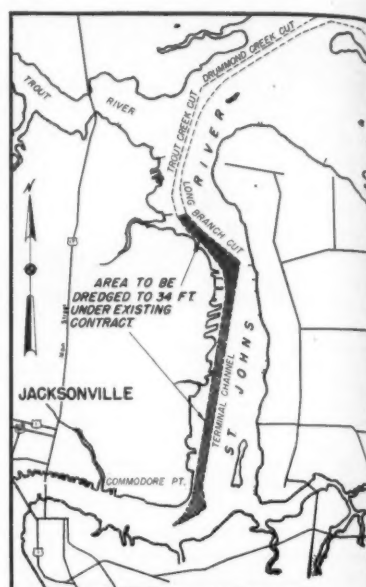
Drill steel of 1½-inch diameter in 40-foot lengths was used, with a 3-inch bit at the end. Drilling was done through a 4-inch-diameter pipe which extended down to the top of the rock. As the hole progressed, a 2-inch pipe was inserted in the opening. When the drilling was finished, sticks of dynamite were lowered down in this casing. Then the pipe was withdrawn, the drill boat taken away, and the blast touched off. During the drilling operations the barge was held in position with three spuds, one on each side and one at the stern, and with haul lines out to anchors at the sides. The haul lines worked on I-R air winches.

Holes were drilled on an average spacing of 8-foot centers across the channel and 6-foot spacing lengthwise of the cut. They were charged with Atlas 60 per cent dynamite, with the amount varying according to the depth of rock to be removed. A 10-foot hole, for example, required about 30 sticks. The holes likewise varied in depth from 1½ to 17 feet, and took anywhere from 20 minutes to 4 hours to drill, depending on the depth and hardness of the rock.

The drill boat worked round the clock, and the log for April 11 of this year, as a typical example, showed that 22 holes were drilled by one boat on that day. The average depth of these holes was 4 feet. In that one-day cycle, 20 hours were required for drilling and moving the rig, 2½ hours for loading, and 1½ hours for blasting.

The Corozal

The Arundel Corp.'s ladder-type



Site of Arundel Corp. dredging job in St. Johns River, Florida.

dredge Corozal used in the rock digging is probably the only one of its kind employed in river and harbor work in this country. Its kind is well known in Europe, and ladder-type dredges of somewhat similar design are used in placer-mining operations throughout the world.

The Corozal was built in Renfrew, Scotland, by William Simons & Co. Ltd., in 1912. It has a wrought-iron hull 268 feet long, a 45-foot beam, and grosses 1,925 tons. Its ladder is 116 feet long with a bucket line of 273 feet, and it can dredge to a practicable depth of 44 feet. Each of the 40 buckets has a

(Continued on next page)

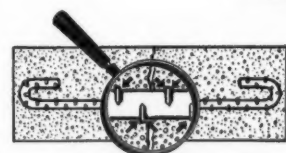
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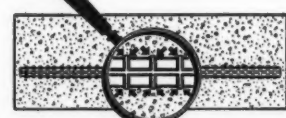
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capacity of 35 cubic feet, and the bucket line makes a complete revolution every four minutes.

The two main engines are triple-expansion type, each with a 960-hp rating at a steam pressure of 180 pounds. They are driven by two Scotch marine 3-burner single-end boilers in connection with a Bethlehem-Dahl oil-burning system. The dredge is self-propelled with two 9-foot 3-inch-diameter propellers having a pitch of 12 feet.

The Corozal has had an interesting history. It was built under contract to the U. S. Government for use in digging the original excavation on the Panama Canal. The Scottish firm submitted a lower bid than American concerns for the construction of the dredge, and President William Howard Taft ordered that it be given the work. When completed, it sailed from Scotland around the Horn to work on the Pacific or Balboa side of the canal construction. Later it worked for the Philadelphia District of the Corps of Engineers, dredging in the Delaware River. It was subsequently purchased by the Arundel Corp.

Rock excavated by the Corozal is chuted out the sides into bottom-dump scows which are then towed away to some deep holes in the river where the material is spoiled. The average length of haul to the dumping grounds was 5 miles.

Hydraulic Dredge Admiral

Most of the yardage on the project was excavated by the Admiral, one of the big dredges of the Arundel fleet. The Admiral was built in 1911 by the Ellicott Machine Corp. of Baltimore, Md., with a 150 x 40 x 11-foot 6-inch steel hull. But it underwent alterations by the Arundel Corp. in 1941 and 1944 at the St. Lucie Yard of the contractor in Stuart, Fla. Forward it draws 8 feet 6 inches of water, and aft 7 feet 5 inches. The main pump has a 31-inch suction and a 26-inch discharge. The dredge is steam-electrically operated with Todd forced-draft oil burners. The lower of the three decks contains the engine and fire rooms and the operating equipment, while the upper two in the wooden housing are for the quarters of the officers, crew, and inspectors.

At the bow of the hull a 70-foot ladder is supported by an A-frame stayed back with two hog wires of 2-inch and 2 1/4-inch diameter, with a 5-sheave block on top and a 4-sheave block on the bottom. For the ladder hoist a 1 1/2-inch steel cable, 640 feet long, is connected to a 2-inch chain bridle shackled to the ladder head. The maximum dredging depth is 50 feet at a 45-degree angle. While the Admiral was not employed on the hard-rock digging, it did encounter and excavate soft rock with a 7-arm rock cutter head. On the softer material a 6-blade cutter head was used.

For the soft grainy limestone digging, the teeth on the rock cutter were given a hard facing about 1/4 inch thick. This was renewed as necessary by inserting new teeth and servicing the ones removed right on the dredge with two Lincoln electric welders.

Main 26-Inch Pump

The 31-inch suction line enters the dredge from the ladder through a 31-inch-diameter rubber connection 15 feet long. Inside the hull at the bow, the line angles sharply in a 10-foot section so as to go back to the pump slightly to the starboard of the center line. In front of the pump is a manhole, with a lid which can be lifted off with an overhead Yale 5-ton hoist for the removal of debris that would otherwise clog the line. The Arundel centrifugal pump with the 31-inch suction and 26-inch discharge is of cast steel with a 78-inch 4-vane impeller. It has a pumping capacity of 25,000 gallons of water per minute. The discharge line leaves the pump on the port side and runs down

the lower deck on the port side, but it makes a 45-degree angle near the stern to leave the dredge for the pontoon line at the center between the spuds.

The hollow steel spuds are 60 feet long, 32 and 34 inches in diameter, and set in a spud frame 29 feet 6 inches from the top of the deck. The spud hoist line is 1 1/4-inch-diameter cable, 350 feet long, and is connected to the top of the spuds by a single sheave. The spuds fit into a well outside the hull, with the port spud down when the dredge is digging.

When dredging, the Admiral swings on a 1 1/4-inch cable 500 feet long, and can cut on widths from 100 to 250 feet. On this job the average width of cut is 200 feet, with the dredge advancing 4 to 6 feet at a step. At the ends of the swing wire are 11,000-pound and 8,000-pound anchors.

Power Plant

A stout bulkhead across the dredge separates the fire room in the aft compartment. (Continued on next page)

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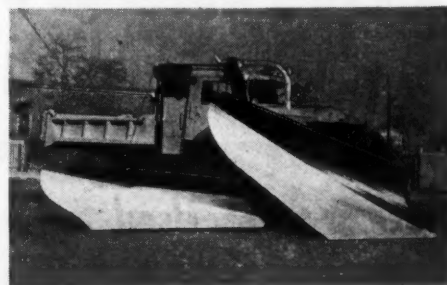
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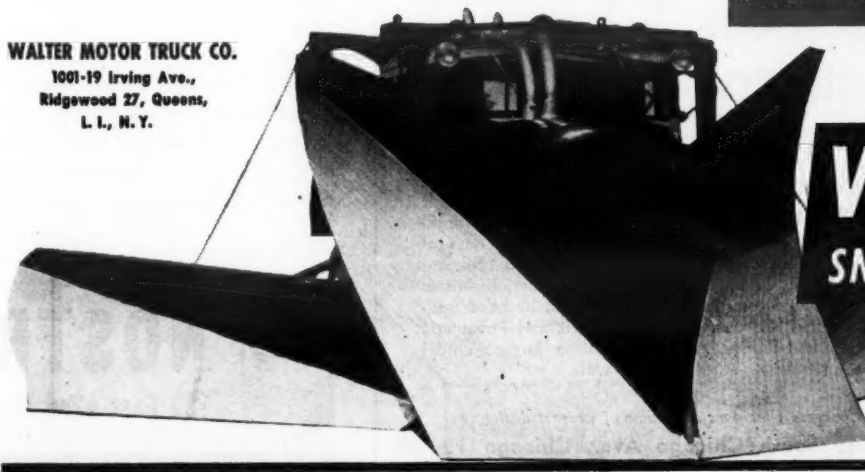
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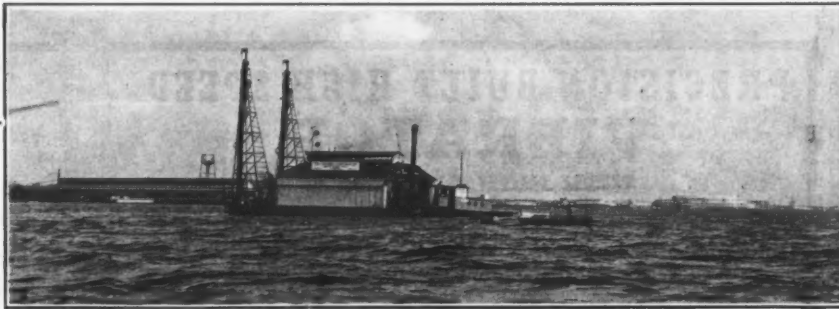


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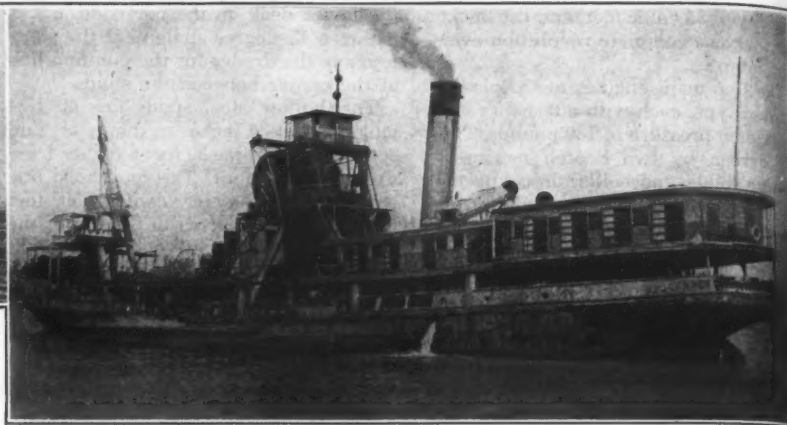
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WALTER
SNOW FIGHTERS



Above, a drill boat drills holes in the rocky bottom of St. Johns River, Fla., to deepen Terminal Channel to 34 feet. At right is the ladder-type dredge Corozal which Arundel Corp. used on rock digging on the job. The rock it excavates is chuted out the sides to bottom-dump scows which transport it to the disposal area. The Corozal was first built by a Scotch firm for the U. S. Government, for digging the original Panama Canal.



Dredging Job Deepens, Widens River Channel

(Continued from preceding page)

partment from the rest of the working area up forward. In the fire room, and separated by a gangway running from the port to starboard sides, are two Foster-Wheeler three-drum A-type bent-tube boilers. They were installed in March, 1941, and have a heating surface of 4,500 square feet each. The steam drum is 46 inches in diameter, while the two water drums have 30-inch diameters. Each boiler has a capacity of from 22,500 to 30,000 pounds of steam per hour at a pressure of 235 psi. Each boiler has two safety valves set at 230 and 235 pounds.

Heating each boiler are three Todd Model A forced-draft oil burners, with turbine-driven wing blowers. The boilers are rated at 1,200 hp each. The fuel capacity of the Admiral is 430 barrels, but additional Bunker C oil is supplied from a 4,000-barrel steel oil barge measuring 110 x 32 x 7 feet. Standard Oil Co. of New Jersey out of Jacksonville supplies the oil which is consumed by the dredge at a daily rate of 225 barrels.

The boilers supply steam for the main turbine, an Elliott turbine-gear set of 3,000 hp at 3,300 rpm, with a steam pressure of 190 pounds and a vacuum of 28 inches. This unit is located directly behind the main pump, slightly to starboard of the center line of the dredge, and with a direct drive to the pump through an 11 to 1, 46 x 32-inch reduction gear with 327 rpm. With the length of discharge line on this job, the turbine employs only about 2,500 hp.

It is located below deck down in the hold.

On deck level, just above the main turbine and placed crossways to it, is an Elliott turbine-gear generator or power turbine which is driven by steam from the boilers. This unit is rated at 716 hp at 3,600 rpm, with 235-pound steam pressure and 28-inch vacuum. An 18 x 11-inch reduction gear at 890 hp changes the rpm from 3,600 to 900 to drive a 500-kw generator. Also on the main-deck level are the main condenser and the power-unit condenser with 1,800 and 800 square feet, respectively, of cooling surface at a single pass.

Operating Machinery

The steam-electric generator furnishes power for the Elliott 500-hp dc cutter-drive motor on a 250-volt line and registering 1,610 amperes on a full load. The motor is reversible, and has a variable speed of from 300 to 600 rpm. A double helical reduction gear with a 20 to 1 ratio permits the cutter head to operate at from 15 to 30 rpm.

Power from the generator also drives an Elliott 150-hp motor which runs the Bucyrus-Erie hauling or swinging gear. This consists of five drums all in line across the deck, the ladder line in the center flanked by the two hauling drums, and with the spud gears on the outside drums. This hauling gear is outfitted with a two-speed clutch.

Steam also drives a Westinghouse turbine electric plant at 25 kw which supplies light for the dredge on a dc line. Steam from the boilers is also employed to run various pumps of different sizes and uses in connection with the operation of the dredge.

If it is necessary to swing the dredge, requiring that the spuds and ladder be raised, this may be done by means of a Reiner-Hercules 100-hp auxiliary diesel engine which turns a 50-kw electric generator set. The latter provides power for a 50-hp electric motor to run the hauling gear. The unit is located in the forward starboard corner of the lower-deck house.

All dredge operations are controlled from the pilot house or lever room, which contains all the levers for operating the cross-deck gear, the main electric switchboard, and control boxes for the swinging and cutter motors. A depth gage on the bow A-frame lets the leverman see at what depth the dredge is digging.

(Continued on next page)

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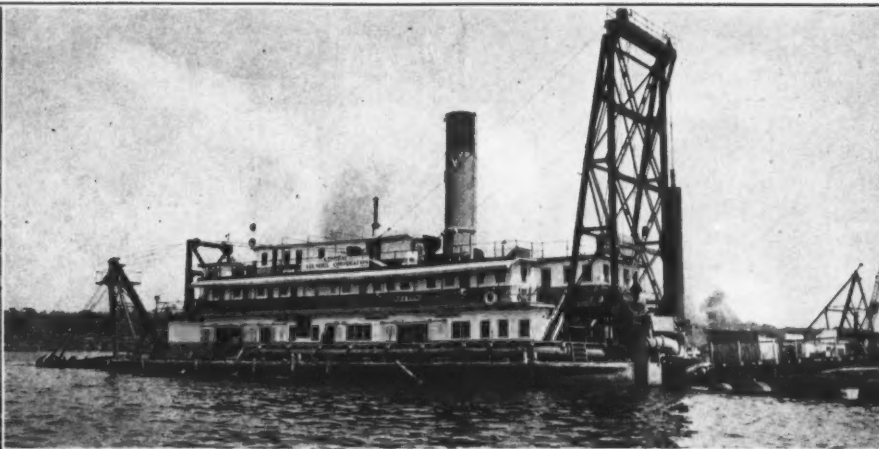
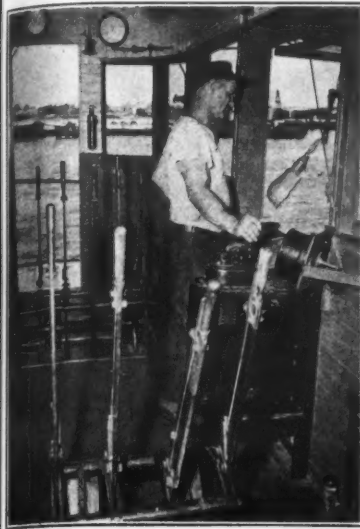
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C. & E. M. Photos

Most of the yardage on the St. Johns River project was excavated by the hydraulic dredge Admiral. All her operations are controlled from the lever room (left). Above, you see her side view, and at the right is a picture of her rock cutter head. She is steam-electrically operated.



On the various materials encountered in the channel, the Admiral has pumped from 3½ up to 15 per cent solids. The vacuum on the pump has ranged from 5 to 15 inches, while the average pressure has been 83 pounds per square inch. The average velocity of flow was 20 fps. In dredging the channel the Admiral has worked in both directions, up and downstream of the river, usually advancing about 1,500 feet on its 200-foot cut before dropping back to work a parallel course in the adjoining cut. Spoil areas on both sides of the river were used so as not to interfere with movements of vessels along the river. In this way the pontoon pipe line did not have to be broken for river traffic.

With its 84-man crew working three shifts a day, seven days a week, the Admiral has pumped as much as 50,000 yards in a single 24-hour period.

Auxiliary Equipment

For maintenance afloat the Admiral has a blacksmith and carpenter shop at the stern on the lower deck. Forward on this same deck is a well rounded collection of machine-shop tools. They include a Whitcomb-Blaisdell heavy-duty 26-inch x 6-foot lathe; an American 24-inch shaper; a Champion 20-inch drill press; and an emery wheel—all driven by individual motors. A Beaver Model B universal-type pipe-threading machine cuts ¼-inch to 2½-inch threads with dies.

The auxiliary floating equipment consists of derrick boat No. 6, a 60 x 30 x 6-foot barge. It has a 10-ton derrick with a 65-foot boom. It is operated by a Lidgerwood hoist driven by a Case tractor gasoline engine, and is used for handling materials and equipment and also for moving the anchors. In addition to the oil barge mentioned above, the Arundel Corp. used a steel work barge measuring 110 x 32 x 7 feet, and a water barge, 60 x 22 x 4 feet, also of steel and with a capacity of 800 barrels.

Two tow boats were on the job—the Captain Al, 42 feet long with a 10-foot beam and 6-foot draft, powered by a Caterpillar 100-hp diesel engine; and the No. 13-T, 30 feet long x 9-foot beam with a 4½-foot draft, and driven by a Cummins 60-hp diesel engine. The Captain Al towed the large barges.

Discharge Line

The total length of discharge line at any one time on this contract was 6,400 feet, of which 2,000 feet was land line and the rest pontoon. The 26-inch discharge line connects with the pontoon line at the aft end of the dredge by means of a swivel elbow. Each 45-foot length of floating line is supported on two pontoons or cylinders, 20 feet long x 5 feet in diameter, set on 28-foot centers. They are at right angles to the pipe and are connected with 12 x 12 strongbacks. Ball joints with a 17-degree swing afford a swivel connection between the pipe lengths making up the pontoon line.

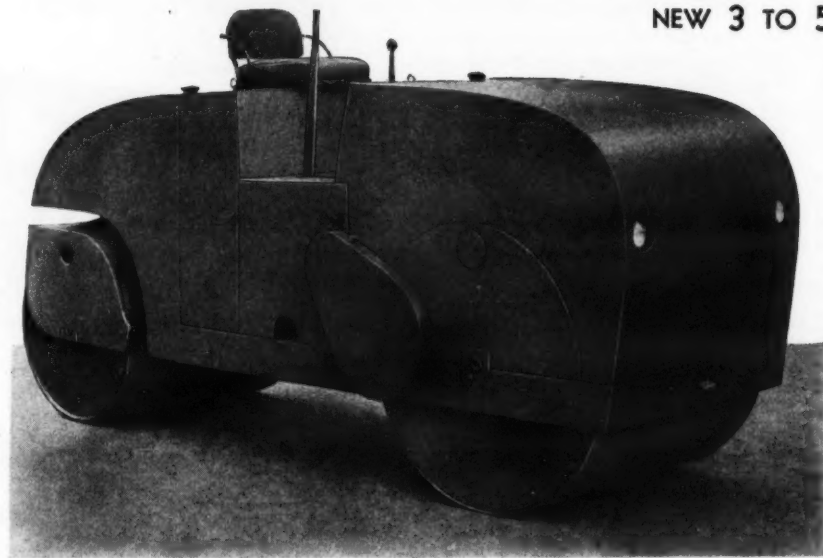
Over the pipe is a catwalk 20 inches wide, made up of two 10-inch boards with a 2 x 4 hand railing on one side.

As the shore is reached, the longer lengths of pipe give way to 16-foot sections joined together with slip male

and female connections making up the land line. For the first 40 feet along (Continued on next page)

Sealcoat TANDDEM ROLLER

NEW 3 TO 5-TON VARIABLE WEIGHT



Right side view of the new SEALCOAT TANDDEM ROLLER. The seat location allows the operator to see the work in all directions. This, with the conveniently located right-hand clutch lever and the left-hand ball top hydraulic steering lever, permits of easy handling whether working in the open or in corners and confined spaces.

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7 TO 10-TON
VARIABLE WEIGHT

MAJOR SPECIFICATIONS

POWER—Allis-Chalmers Industrial Model B, 24.5 Brake Horsepower @ 1500 RPM; 27.8 Brake Horsepower @ 1800 RPM. Speeds: 2 forward and 2 reverse give 1.55 to 4 MPH range in either direction.
DIMENSIONS: Wheel Base 91". Length overall—132". Width overall—43". Tank height—57". Ground clearance—13¼". Left side clearance—1½". Right side clearance—3½".
ROLLERS: COMPACTION—Width—38". Diameter—40". Rolled and machined from ¾" stock.
STEERING—Width—38". Diameter—30". Rolled and machined from ¾" stock.
COMPRESSION—Per lineal inch: Compaction Roller—155 lbs. with ballast. Steering roller—75 lbs. with ballast.
WEIGHTS: Shipping weight (approximately) 6500 lbs. Maximum weight (with ballast) 10,000 lbs. Extra metal weight—600 lbs.

Handles all asphalt gravel or other rough surface jobs with remarkable ease at money-making speed. Works in corners, confined spaces and maneuvers easily in small areas with short 91" wheel base. With but 1½" of frame extension on left side it can work WITHIN 2 INCHES from buildings, fences, etc. To eliminate hand finishing, has 13¾" ground clearance to allow hair-line finishing when working along curbs and other raised side obstructions. SINGLE LEVER HYDRAULIC STEERING permits fast, tireless handling. Geared bull wheel provides positive power transmission and allows faster starts and stops. Other features: Foot operated Parking and Service Brake, Electric Starter, Turns in 12' circle, Low center of gravity, Free access to working parts. Easily transported, etc.

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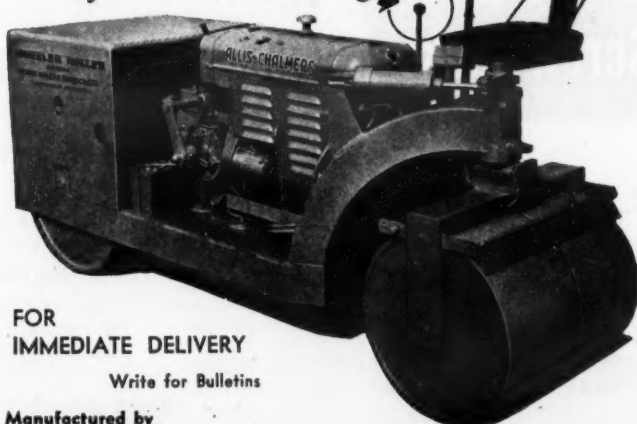
This is essentially the same in its sturdy construction and major operating features as the SEALCOAT Roller (above). Power specifications are identical. It is basically different in design and other minor specification differences given below.

MAJOR SPECIFICATIONS

DIMENSIONS: Wheel Base 7'10"; length overall 107"; width overall 3'6". Tank height 4'10". Ground clearance 10". Left side clearance 1½".
WEIGHTS: Shipping weight (approximately) 5500 lbs. Maximum Weight (with ballast) 8000 lbs. Extra metal weight 400 lbs.
COMPRESSION: Per Lineal Inch: Compaction roller, 150 lbs. with ballast. Steering roller, 70 lbs. with ballast.
ROLLERS: COMPACTION—Width—36". Diameter—37". Rolled from ¾" stock.
STEERING—Width—34". Diameter—27". Rolled from ¾" stock.
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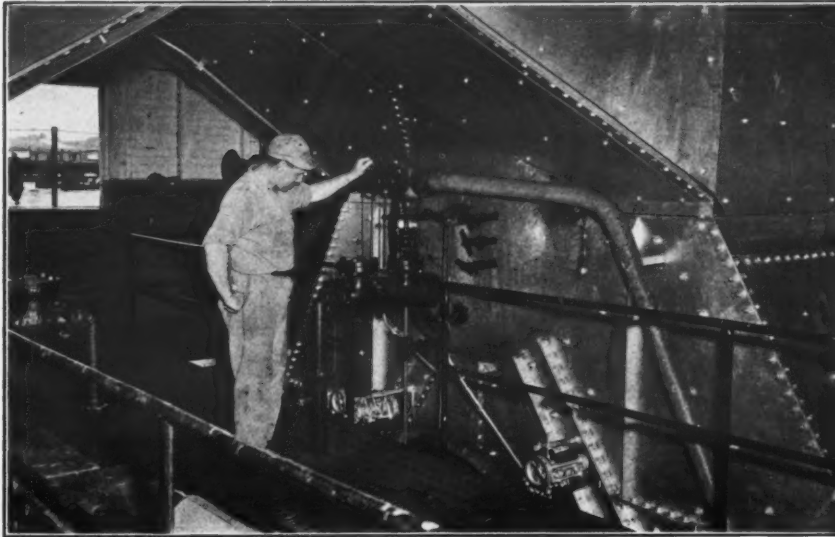
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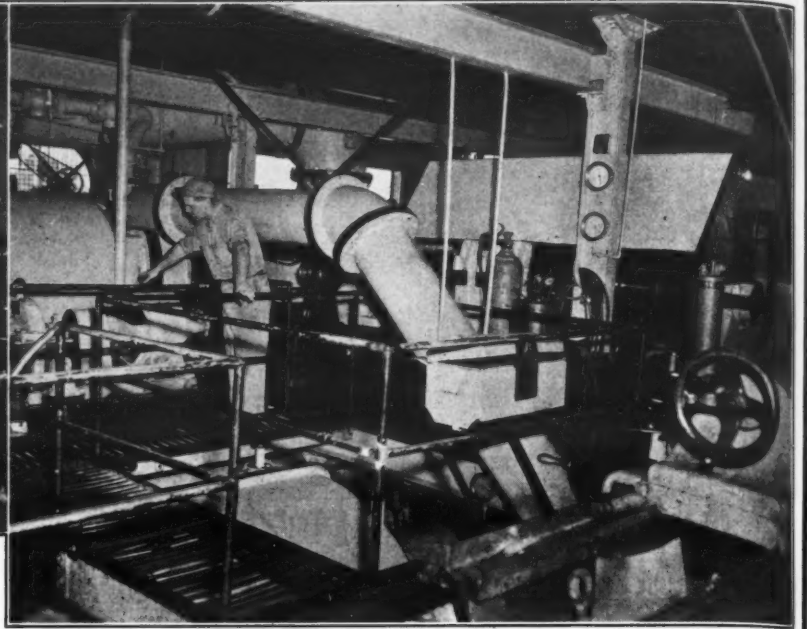
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C. & E. M. Photos
The dredge Admiral's Chief Engineer Homer J. Masculine is shown above, in front of a Foster-Wheeler boiler. There are two of these boilers on the dredge, each with a capacity of 22,500 to 30,000 pounds of steam per hour at a pressure of 235 psi. At right is the engine room, where Chief Engineer Masculine inspects the light plant.



Dredging Job Deepens, Widens River Channel

(Continued from preceding page)

the beach the pipe is supported on timber cribbing, but after that it is laid on the ground. A "flower pot" or baffle board is erected at the discharge end of the line to promote the deposition of solid material. A land crew of 25 to 30 men handles the shore pipe with the help of a Caterpillar D4 tractor.

Personnel

Captain J. A. Masculine, with 50 years of dredging experience, was Superintendent on the contract for the Arundel Corp. His son, H. J. Masculine, is Chief Engineer on the Admiral, with Captain Ed Simpson Master of the dredge. For the Corps of Engineers Asa D. Brown was Project Engineer, and W. A. Sallas was Inspector on the project. The Jacksonville District is headed by Col. Willis E. Teale, District Engineer, with John P. Peyton as Executive Officer and A. H. Brown as Chief of Operations. Major Nat A. Holman is Chief, Technical Information Branch.

St. Johns River

The St. Johns River will be dredged still farther downstream, continuing from the end of the Terminal Channel project at Trout River to Dames Point,

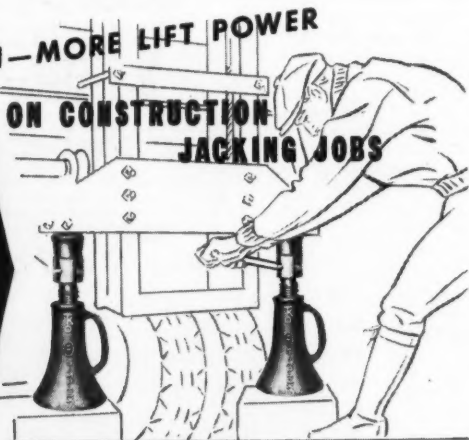
a distance of 5½ miles. A contract for this work was awarded to the Atlantic, Gulf & Pacific Co. on its low bid of \$884,741.00. The contract calls for widening and deepening the channel to 34 feet below mean low water and involves dredging 2,530,000 cubic yards. The A. G. & P. Co., however, arranged to have the Arundel Corp. do the work for it, so the Admiral is expected to see additional service on this stretch of the river. In turn, the A. G. & P. Co. will do a dredging job in Savannah harbor for the Arundel Corp. On the latter job the A. G. & P. Co. will use its dredge Baltimore which recently completed extensive dredging in Charleston harbor. (See C. & E. M., June, 1948, page 78.)

Deepening the rest of the navigation channel in the St. Johns from Dames Point Cut to the ocean will depend upon future appropriations and allotment funds. At the mouth of the river the Corps of Engineers' sea-going hopper dredge Hains has restored the navigation channel to the project depth of 30 feet by removing over 500,000 yards of material. It is interesting to note that the first Congressional appropriation for improving navigation in the river was made by the River and Harbor Act of August, 1852. In 1896 a channel depth of 24 feet was authorized, and in 1910 this was increased to 30

(Concluded on next page)

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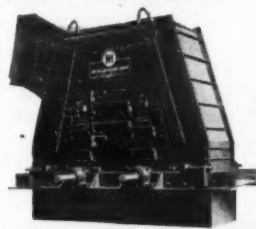
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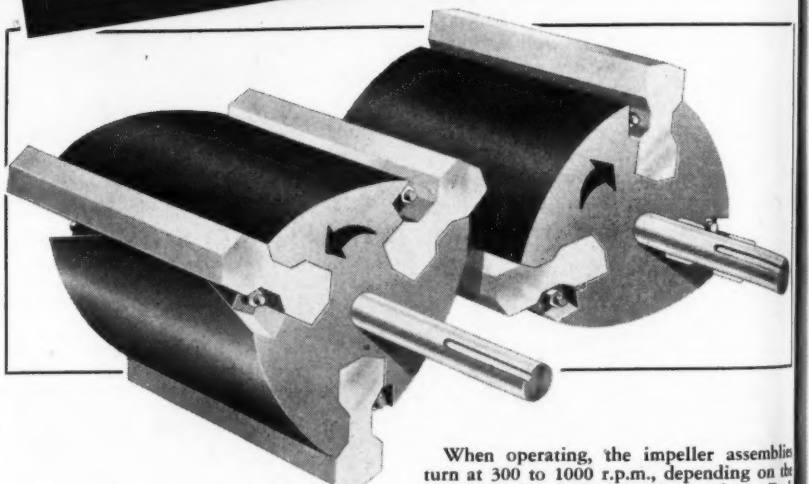
TEMPLETON, KENLY & COMPANY

1006 South Central Ave., Chicago 44, Illinois



NEW HOLLAND Double Impeller BREAKERS

...Produce Only
Cubical Aggregate
NO SLIVERS...DISCS...OR ODD SHAPES



Twin Impellers

BREAK STONE IN MID-AIR
... ON LINES OF NATURAL WEAKNESS

Dynamic Dual Impact Action of the New Holland Double Impeller Breaker produces sound cubical aggregate with great economy of power and metal. Three simple adjustments control sizes of end products... coarse or fine. Dual Impact Action gives you exactly what you want.

Every Double Impeller Breaker has two impellers... each fitted with three impeller bars. These assemblies rotate in opposite directions... away from each other. Impeller bars strike upward, outward blows.

When operating, the impeller assemblies turn at 300 to 1000 r.p.m., depending on the characteristics desired in the product. Rock fed into the breaker receives its first impact while still in mid-air. Fragments are hurled against other rocks and five-inch steel breaker bars. Each rushing piece becomes a hammer... reducing itself and the others it strikes.

Because the impellers rotate away from each other there is no grinding action... no choking or packing. Every last ounce of energy is used for breaking stone. That means more production at less cost per ton... more profits for you.

See why reduction by impact means greater profits from a more saleable product. Write for literature on New Holland Double Impeller Breakers today.

You have your choice of Dual Impact Action in these sized models—1520, 2020, 3020 and 5050.

NEW HOLLAND MANUFACTURING COMPANY
DIVISION OF NEW HOLLAND MACHINE COMPANY
MOUNTVILLE, PA., U. S. A.

Ask your New Holland Distributor to show you the full color, sound movie "The New Stone Age."

NEW HOLLAND
DOUBLE IMPELLER *Breakers*



feet. When the 34-foot channel to the ocean is completed, it will permit the passage of the newer larger-type tankers and freighters, drawing up to 34 feet of water, and should materially increase water traffic in and out of the Port of Jacksonville.

In addition to the 10 miles of channel deepening and widening below Jacksonville, the St. Johns River is also being improved in its upper reaches from Jacksonville south to the Lake Harney section, about 145 miles. The Hill Dredging Co. of Ventnor, N. J., has been engaged in this work with its 22-inch suction dredge Ventnor. The first portion of this project extended from Jacksonville to Palatka, a 55-mile stretch which was deepened from 8 to 13 feet. The remaining 90 miles is now being dredged to a depth of 12 feet.

Other Dredging

The Arundel Corp. is also engaged in dredging the Lake Worth Inlet leading to the Port of Palm Beach, deepening the outer and inner channels from 20 to 25 feet. The same company also has a job at St. Lucie Inlet, removing rock shoal areas at the seaward entrance to the harbor of Stuart, Fla. This work will provide a 10 x 200-foot channel.

The Standard Dredging Corp. of New York City has completed a sizable dredging job in Hollywood Harbor, Port Everglades, Fla., where it removed about 636,000 cubic yards of material with the 27-inch hydraulic dredge Jamaica Bay. This was a 35-foot project for widening the existing turning basin, and also cutting off the flare at the junction of the turning basin and the ship channel.

An important project being completed this summer is the repair of levees along the southern rim of Lake Okeechobee, Fla., which were damaged from wave action in the September and October hurricanes of last autumn. This work is under contract to the Atlantic Dredging & Construction Co. of Satusma, Fla., and involves dredging suitable material from the lake to place on the levee. About 95,500 cubic yards of muck first had to be removed as overburden from the bottom of the lake to reach the required material beneath. About 75,000 yards of suitable excavation was then pumped up on the earth embankments. Much of the suitable material first had to be blasted before it could be pumped.

These levees are built only along the



C. & E. M. Photo

Left to right are Inspector W. A. Sallas of the Corps of Engineers; Chief Engineer H. J. Masculline of the dredge Admiral; Major Nat A. Holman, Chief, Technical Information Branch, Corps of Engineers; Captain J. A. Masculline, Superintendent for the Arundel Corp.; and Captain Ed Simpson of the Admiral.

northern, southern, southeastern, and southwestern shores of the lake where the topography is low. A cross-state

waterway, with a controlling depth of 6 feet, makes use of Lake Okeechobee in traversing Florida from Stuart on

the Atlantic to Fort Myers and Punta Rasa on the Gulf of Mexico.

Accessories for Concrete

A catalog on Medco construction accessories has been prepared by Meadow Steel Products, Inc., P. O. Box 1450, Birmingham 1, Ala. It describes a line of form-clamping products, accessories for use in placing steel for reinforced concrete, and specialties for use on road or building-construction projects.

Among the items listed in Catalog No. 300 are ties and clamps, rod pullers, beam clamps, hangers, saddles, screed chairs, bar ties and tie chairs, anchors, wall plugs, dowel-bar assemblies, stakes, expansion tubes, and others. The various items are illustrated, and information is included on their special uses. The sizes in which each unit is available are listed, as well as its special features.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 5.

Local Engines Make Good



WAUKESHA ENGINES

• With the "home town folks" there's no distance to lend enchantment. They know what you make, and how you make it. If they use what you make, like what it does for them and how it does it... and say so... you've got something!

When Mr. E. J. Stephan and Mr. Grover Dobbartin tell you, "For many years Waukesha County has been purchasing road equipment powered with Waukesha Motors" and speak of Waukeshas' "fine performance" it is significant. They are the Highway Commissioner and the Chairman of the Highway Committee of Waukesha County.

They go on to say: "Most of our large maintenance trucks are equipped with your motors as well as a large power shovel and air compressor. These units have given us very satisfactory results."

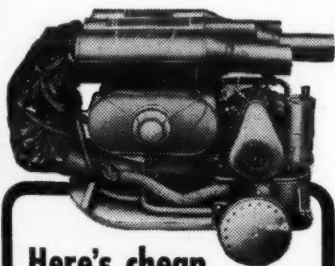
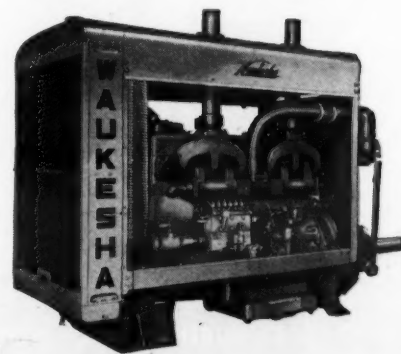
"Just recently we purchased one of your LARGE DIESEL POWER UNITS for our new crushing plant and it is proving out far beyond our expectations. One short day we crushed over 600 yds. of gravel, which is about double the production of the unit owned and operated by Waukesha County previous to

the installation of the Waukesha Motor Company Diesel... The service that you render when needed is superb."

The Diesel unit referred to is the Waukesha Super Duty Diesel. Mounted on its own trailer it is a general utility rig and may be used for any number of applications.

Consult Waukesha engineers on all your power problems. Send for Bulletin 1418.

**SUPER DUTY
DIESEL Model
6-WAKDU
POWER UNIT**
six cyl., 6 1/2 in.
bore x 6 1/2 in.
stroke, 1197
cu. in. displ.,
190 hp. max.
rating at 1300
rpm.



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HEAT for

CONTRACTORS - GARAGES

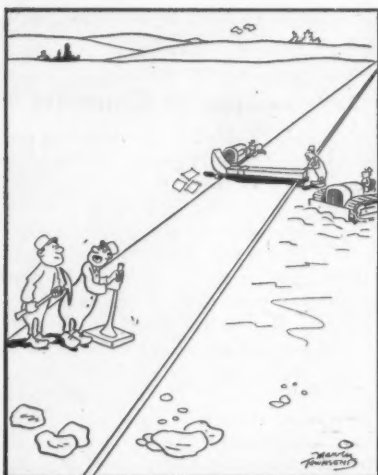
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WAUKESHA MOTOR COMPANY, WAUKESHA, WIS., NEW YORK, TULSA, LOS ANGELES



Dozer, Scoop, Hoist For Light-Duty Use

A line of equipment including a light-duty adjustable dozer blade, a loader-scoop, a wagon hoist, and a platform-less trailer unit is made by the Lundell Mfg. Co., Meriden, Iowa. The dozer blade is recommended by the company for use in angle grading, snow removal, etc., and is designed for attachment to light-duty rubber-tired tractors. It has an approximate weight of 250 pounds, and is made of 1/4-inch reinforced steel plate.

The loader-scoop has a 7-foot width and is designed for moving cement, soil, sand, and similar uses. The hydraulic wagon hoist is made in four sizes and styles, varying in length from 10 to 14 feet, and in capacities of 3 to 3 1/2 tons. The running gear has a capacity of 3 tons; its wheels are equipped with Timken bearings, and it has an adjustable wheelbase which can be set from 8 to 12 feet.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 44.

Light-Duty Crane Units

Literature describing the light-duty all-purpose Roustabout crane can be obtained from The Hughes-Keenan Co., 649 Newman St., Mansfield, Ohio. The unit is designed for use with various wheel or track-type tractors, and is made in several models with capacities of up to 7 1/2 tons.

The catalogs point out the principal

features of each of the Roustabouts, and list the equipment with which it can be used. Photographs show these cranes in action, mounted on the various types of tractors. Load charts which are reproduced contain technical data on booms, loads, and on general crane operation. Component parts of the Roustabout are discussed in detail, and an entire page of each catalog is devoted to a list of specifications and dimensions.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 69.

New-Type Rock Bits Screw on Drill Rods

Chisel-type rock bits to be screwed onto standard drill rods are announced by Kennametal Inc., Latrobe, Pa. They are offered in six sizes: 1 3/8, 1 1/2, 1 3/4, 2, and 2 1/4 inches. The threads inside the body of the bit are designed to provide a shouldered contact between the bit body and the drill rod; they screw onto steels having F, H, or D threads. The blade is held in the body of the bit by a Kennametal-developed mechanical seating.

Water ports in both bevels are provided to give positive circulation. According to the manufacturer, no conversion of existing equipment is necessary to use these bits. The manufacturer also states that with these drills, increased drilling speeds can be obtained, any material can be drilled, and the bit can be used on either light or heavy equipment.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 63.

Pull-Grader Bulletin

A bulletin on the Husky road graders and maintainers is being distributed by the Northfield Iron Co., Northfield, Minn. The units are made in two models, the No. 22 and the No. 33, and both are described in detail. Stressed throughout bulletin No. 46 are the strength and durability features claimed for this equipment. Husky graders and maintainers can be used with high-speed trucks or pulled by tractors.

Photographs and drawings in the bulletin illustrate the construction of the various parts of the units. They show the goose-neck tractor hitch, the Husky front-end control, and the quick-acting wide range offset. The specifica-

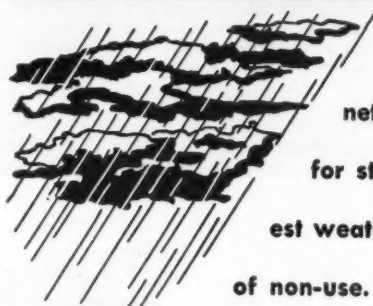
tions listed cover the wheelbase, tread, blade construction and dimensions, and other pertinent facts. The No. 22 shouldering machine with trailer drag is also described in this bulletin.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 93.

Vilsack to Taylor Forge

Robert M. (Bob) Vilsack has joined the Sales Department of the Taylor Forge & Pipe Works, Chicago manufacturer of pipe and welding fittings. This company also operates plants at Carnegie, Pa., and Fontana, Calif.

Foul Weather FRIEND



Your Fairbanks-Morse Magneto ignition gives a sure spark

for starting and operation in foul

est weather—even after long periods

of non-use. No other ignition can serve

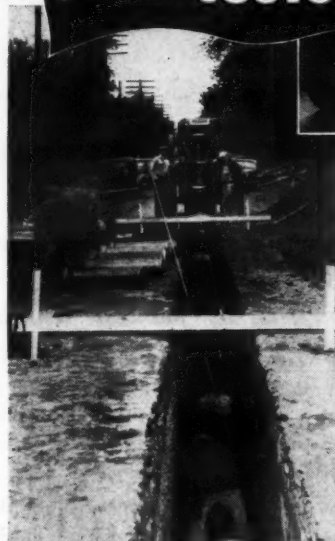
you so well!

...Your Magneto Ignition by

FAIRBANKS-MORSE

Sold and Serviced by Over 2,000 Experts

cut TRENCHING costs!



BADGER TRENCH EXCAVATOR

FAST, CLEAN, ECONOMICAL

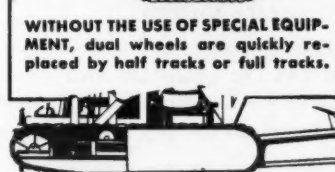
7 to 24 inch width
up to 11 foot depth

Pennies saved per foot of trenching assure more profit dollars per job!

Over fifty advancing speeds equip the one-man economical Badger Trench Excavator to operate in and on any kind of soil. Patented high speed shovels dig fast and uniformly... do not require an unwieldy, bulky machine to assure 'bite' or purchase. Reversible cross conveyor and trench shields keep waste away from trench. Overload safety clutch protects machine and prevents damage as the Badger digs forward or backward, over, under and around obstructions. Ball bearings on all high speed shafts and bronze or babbitt bearings on low speed high torque shafts assure long life dependability.

25 MPH ROAD SPEED

Model 202 with rear dual wheels offers cost-cutting mobility of twenty-five MPH road speed. Eight MPH is recommended speed when unit is equipped with tracks or half tracks. All Badger units are easily transported on 1 1/2 ton truck. Contractors, municipalities and utility companies are cutting costs and boosting profits with the Badger Trench Excavator. Let the Badger dig for profits for you, too!



WITHOUT THE USE OF SPECIAL EQUIPMENT, dual wheels are quickly replaced by half tracks or full tracks.



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BADGER MACHINE CO.

Dept. E WINONA, MINNESOTA

ANOTHER
Bosworth
DEVELOPMENT

The NEW
MODEL L-VATOR
BUCKET TYPE
CONVEYOR

has been designed for general industrial use. Its uses are limitless. It will handle ash removal in boiler rooms and also convey coal for deposit in the master hopper. It will also handle comparable material such as fertilizer, sand and many others with equal facility. Its capacity is approximately 25 tons per hour. As far as height is concerned it can be furnished in practically any size desired up to 50 feet.

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BOSWORTH MANUFACTURING CO.
6723 Denison Avenue • Cleveland 2, Ohio

Asphalt Runways Laid For Baltimore Airport

(Continued from page 2)

Friendship Church, a small structure in the center of a tiny community at one end of the site, gave the airport its name. The topography of the area was rolling, marked by sharp rises and dips, and consisted chiefly of farm land plus a few cemeteries. Elevations at the site varied from a high of 195 to a low of 80 at the outer edges. What makes the field outstanding as a suitable site for an airport is the soil, for the entire area is chiefly sand or sand-gravel. This is easily excavated and, when properly compacted and stabilized, will support heavy loads. There were some deposits of white, silty clay, but these were dug out and the holes backfilled with suitable material.

No borrow was required in the grading operations which consisted in the main of leveling off the high spots and filling in the low places. Furthermore, all the material for an excellent subgrade was present right at the site. In addition, 200,000 cubic yards of topsoil were stockpiled for use later on the shoulders, and a 150,000-yard stockpile of sand and gravel was set aside to provide base-course aggregate.

Over the entire job the maximum cuts and fills were 25 feet, with the average somewhere around 15 feet. The high point of the field is at the center, with drainage running off to the periphery. Longitudinally along the runways the grade is practically flat, with the steepest stretch only 1/2 of 1 per cent. The pavement slopes both ways from the center line on a 1 per cent grade.

Grading Contract

The principal item in the grading contract was 6,600,000 cubic yards of unclassified excavation. Of this amount, approximately 400,000 yards was undesirable clay which was undercut to a depth of 5 feet 3 inches below the finished grade, and backfilled with 8-inch layers of compacted sandy material. The rest of the area was a dense, sandy gravel. The larger clay pockets were found by borings, while the smaller deposits were detected by the rutting of the surface under the heavy compaction equipment. The ground thus affected was marked off for undercutting and backfill.

About 430 acres of the 3,200 acres comprising the site were cleared of trees, brush, and stumps. Both dozers and clamshells on cranes were used. The debris was burned. For primary drainage of the field, 10,316 linear feet of reinforced-concrete pipe from 24-inch to 60-inch diameter was installed. While these operations were getting under way, a mighty fleet of earth-moving equipment was assembled at the site.

C. J. Langenfelder & Son, Inc., set up a schedule of grading operations to complete the job within 300 calendar days. To achieve this goal the company planned to move an average of 30,000 yards a day, with due allowance for idle days on Sundays, holidays, and unfavorable weather. Actually it did much better than that. From the end of May until the first part of December, 1947, or over a six-month period, it averaged better than 1,000,000 yards a month. The peak was reached from July to the end of October when 50,000 yards was moved nearly every day that weather permitted the machines to work. On several days, the yardage moved crept over the 60,000 figure, with a high of 60,426 cubic yards of dirt moved on October 6. Two 10-hour shifts were employed in the grading: the first was from 6 a.m. to 4:30 p.m., and the second was from 5 p.m. to 3:30 a.m.

By December, when bad weather shut the job down, the contractor had his big earth-moving project well under control, having moved 6,233,636 cubic yards of material. The comparatively small

amount of yardage remaining in the contract was finished last May.

Varied Equipment

Varied types of earth-moving equipment were used in grading the airport. They included tractor-scraper units, self-propelled rubber-tired scrapers, and bottom-dump wagons which were filled to capacity either by shovels or loaders. Careful check was kept on all the equipment to see how much dirt was moved with each type, and also on the haul lengths involved.

Tournapulls accounted for more than one-third of the total yardage. Thirteen Super C models with LP Carryalls averaging 12 to 15 yards a load moved 2,112,931 yards. An electrically operated B31 model, acquired the summer after

the job had started, accounted for 33,193 yards. Hauls with these units ranged from 1,500 up to 3,000 feet. These distances were broken up into increments of 300 feet for further analyses of performances, and the respective yardages calculated accordingly. Thus, for instance, the greatest amount of dirt moved by the Tournapulls—a total of 1,337,452 yards—was on hauls between 1,500 and 1,800 feet.

The latter held true for three Wool-dridge 15 to 17-yard Terra-Cobras which moved 380,943 yards over 1,500 to 3,000-foot hauls, or 104,774 yards in the 1,500 to 1,800-foot bracket. Five Caterpillar DW10 wagons, holding 7 yards each, accounted for 295,010 yards on hauls averaging 800 feet. Eleven bottom-dump Euclids of 13 to 16-yard average

capacity totaled 1,449,373 yards; of this, 1,062,385 yards were loaded by shovels and the remaining 386,988 yards were handled by a Euclid loader. The Euclids were put on the longest hauls ranging from 2,000 to 4,500 feet. For closer scrutiny, these distances were broken up into 500-foot increments, and it developed that the 2,000 to 2,500-foot sections were responsible for the greatest yardage.

After the Tournapulls, the greatest quantity of dirt moved by any one type of equipment was credited to tractor-scraper units, working on hauls from 400 to 1,600 feet. The most popular distance for these rigs turned out to be 600 feet. An average of 12 scrapers was used, including 7 LP and 2 YR Le-

(Continued on next page)



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The contractor's only single source for a complete outfit of job-tested concrete paving machinery is . . .

BLAW-KNOX

Asphalt Runways Laid For Baltimore Airport

(Continued from preceding page)

Tourneau models and 3 Gar Wood units. They were pulled by 5 Caterpillar D8 tractors and 7 Allis-Chalmers tractors—5 HD-14's and 2 HD-19's.

An assortment of other tractors was available on the job for snatch-loading the Tournapulls and push-loading the other earth-movers. Tractors were also employed with dozer blades to spread the material after it was dumped, and to haul the heavy compaction rollers. They included 4 D7's, 3 D8's, 5 International TD-18's, and a couple of Allis-Chalmers HD-10's.

Excavators included two Lorain 82 shovels built up from 2 to 2.7-yard bucket capacity; and three cranes which were also used as draglines—a Lorain 41, a Lima Paymaster, and a Koehring.

Heavy Compaction

One of the most important items in the contract called for the compaction of 4,093,000 cubic yards of material spread out over the big airport. This covered not only the ground under the runways but also 12 feet beyond the sides of the pavement. If a plane should run off the paved area, it would still be supported on the densely packed sand-gravel subgrade. The fills were laid in 8-inch lifts and compacted to a density ranging between 95 and 105 according to the modified Proctor standard. This was at the optimum moisture content which was below 10 per cent. If the moisture exceeded this limit, it worked through the fills to the surface of the ground under the heavy compaction equipment.

Generally, little water was added during the rough grading. While the soil drained well and kept drainage problems to a minimum, enough natural moisture was present to satisfy the compaction requirements. Then too, the ground was opened and the dirt moved so fast in the 20 out of 24-hour operation schedule, that the soil didn't have time to dry out completely before it was compacted in the fills. Still, the average monthly consumption of water during the rough grading was 500,000 gallons. But the greater percentage of this figure was used in wetting down the haul roads, keeping them smooth and hard-packed so that the grading equipment could travel at top speed with peak loads.

Water was purchased from the Anne Arundel Sanitary Commission, and was metered from a standpipe at the job site as the tank trucks were filled. Most of the wetting down was done by a Mack L5 truck on which was mounted a 3,500-gallon tank. This had a gravity-feed spray bar at the front, and a force-feed spray bar at the center. Water was forced out from the latter by a 4-inch pump.

Each 8-inch lift was compacted by sheepfoot rollers which exerted a pressure of 500 pounds to the square inch under the feet. Three sets of triple Tampo rollers were used in this operation, each three-drum set pulled by an Allis-Chalmers HD-10 tractor. A two-and-one hook-up, with the first two drums abreast and the third towed behind at the center, was employed. The feet in the rollers are 7 inches long and have an area of 7 square inches. The drums are 4 feet in diameter x 5 feet long. Four passes of a set were made over each lift.

Super-Compactor

In addition to the sheepfoot rolling, the soil was flattened still more by a huge rubber-tire super-compactor nicknamed "Big Bertha". This unit was especially designed and built for the job by the consulting engineering firm of O. J. Porter & Co. of Sacramento, Calif. It consists of two steel bodies, 20 x 7 x 6 feet deep, placed alongside each other, with two axles on which roll four huge rubber-tired wheels, two wheels in each box. The 30.00 x 33 Goodyear tires are just under 8 feet in height, are nearly a yard wide, take 150 pounds of air pressure, and have 60 plys. With an inner tube, each tire weighs about a ton.

The super-compactor weighs 40 tons, and is loaded with 18-pound steel billets. It is designed to be loaded up to 200 tons, but on this job the customary load was 150 tons. "Big Bertha" was pulled at a speed of about 5 mph by two Allis-Chalmers HD-19 tractors, working in tandem and connected by a 20-foot length of double 1-inch steel cable. The rear tractor was hooked to the unit by steel-plate shafts coming off a reciprocating draw bar joining the two boxes; in this way the great weight was evenly distributed.

This more-than-ordinary compaction was deemed necessary, particularly in cut sections, because of the comparatively shallow 10-inch pavement which will carry planes weighing 300,000 pounds. It was felt that more than just

the surface of the subgrade should be compacted if the pavement was to withstand such heavy loading. This super-compactor compressed the layers of material deep in the ground, thereby preventing subsequent settlement and pavement rutting. In this way the soil became practically a voidless mass to a depth of 6 feet. The sand and gravel thus compressed weighed around 130 pounds per cubic foot, as compared to 105 pounds per cubic foot before rolling.

In fact, at one place where a culvert had to be relocated in a fill section after compaction, the trench was excavated with great difficulty; moreover, the slopes held on vertical lines. In an ordinary cut the slopes sloughed off on a natural 1½ to 1 incline.

The super-compactor made four passes over the subgrade. In the cut sections the settlement was as great as 4 inches, but in the fills, where each

(Concluded on next page)

Not just because it reduces the pull on steering levers to five pounds, or even less, but because it reduces wear on clutches, throwout bearings and brakes. Silver Steering Boosters pay their cost many times over in many ways. Any tractor dealer will install one on trial, ON APPROVAL, in less than thirty minutes. Ask your dealer to demonstrate a Silver Booster and you will never operate a tractor without one.

Silver BOOSTER MANUFACTURING CO.
1406 SOUTH GRAND AVENUE
LOS ANGELES 15, CALIFORNIA Richmond 4191

The Imperial Ready Mix Company's 14 Dumpcretes are busy hauling top-quality air-entrained concrete in and around Chicago.

The above photo shows a Dumpcrete pouring foundation piles at the new A. B. Dick Co. plant after a 14-mile, 50-minute haul.

By controlling the mix at the central plant, every load is uniform. Each has just the right amount of air to maintain top-to-bottom uniformity. No additional air is beaten into this "controlled mix" by the non-agitating Dumpcretes during the haul... so the delivered concrete is all according to specification.

The Dumpcretes save money too. They cost less to buy and less to run.

Every concrete man wants to deliver better concrete at lower cost. Write for complete information today.

DUMPCRETE DIVISION
MAXON CONSTRUCTION CO., INC.
506 Talbot Bldg., Dayton 2, Ohio

The Dumpcrete Body

Lightweight, water-tight, loads fast, dumps fast or slow, places anywhere, costs less to buy and run. Ideal for hauling aggregate, coal and earth.

* Dumpcrete Concrete is central-mix air-entrained concrete hauled and placed with the speedy, low-cost Dumpcrete. Provides top-quality, plastic, workable and non-segregating concrete, saving up to \$1.00 per yard.

1 - CONTRACT 8 - JOBS 11,000 Cu. Yards of Concrete 115 Moves

A 3/4 yd. Strayer Portable Concrete Plant averaged 24 cu. yards an hour under severe conditions, pouring 150 batches in one 5 hour period and paid for itself several times over. That was before the war—today's Strayer plant is easier and faster in operation thanks to fingertip hydraulic controls on all gates and many other design refinements.



PORTABLE CONCRETE PLANTS

Write today for complete data on the Strayer Portable Concrete Plant that combines vertical conveyor to 3 compartment 20 cu. yd. Bin Storage—Weighing AggreMeter—Cement Pre-mixing—Accurate Water Control—Engine Drive. All mounted on 8-Wheeled chassis permitting moving from job to job.

STRAYER Portable CONCRETE PLANTS

Erle Steel Construction Co., 2810 Geist Rd., Erle, Pa.

BUCKETS • AGGREGATE METERS • PORTABLE CONCRETE PLANTS

8-inch lift had been well rolled, the settlement was only about one inch under the super-compact.

Preparing for the Pavement

Provisions for more compaction were also included in the subsequent paving contract. This further insured a deep solid foundation in material of high supporting power, so that a thick multi-layer pavement would be unnecessary. One item in this second contract called for the super-compaction of 1,269,000 square yards of subgrade with eight passes of the sheepsfoot roller, and eight more coverages of the super-compact. When additional rolling was required, the units were paid for on an agreed-upon hourly rate. Any soft spots remaining were discovered by the sinking or sliding of the big rubber-tire roller. They were at once removed, and the holes were backfilled with sand and gravel which was compacted like the rest of the field.

Selected material was then blended into the subgrade to form the base course for the pavement. This material also came from the site, and conformed to these gradation requirements:

Sieve Size	Per Cent Passing
3-inch	100
No. 10	55-95

(Not more than 70 per cent passing the No. 40)

It was spread in a 7 to 8-inch layer, harrowed and bladed, and then compacted by both the sheepsfoot rollers and "Big Bertha". The compaction, with eight passes or coverages by both types of rolling equipment, completed the blending into the subgrade. There was little difference anyway between the subgrade material and the selected sand-gravel put into the base course. If settlement occurred in building up the base, more material was spread out and blended by compacting. The sub-base was thus built up to an average depth of 13 inches. The final shaping was done by motor graders: 2 Caterpillar No. 12's, 1 Allis-Chalmers, and 1 Adams 414. These graders were also used to keep the haul roads in shape.

As nearly half the yardage on this big dirt job was moved on the second shift, from 5 p.m. to 3:30 a.m., artificial lighting was an important consideration. Two Navy-surplus lighting units were purchased and remodeled for construction purposes. They consisted of an International truck, on which was mounted a Le Roi gasoline engine driving a Marble-Card generator which



Essex Photo Service Photo
This Navy-surplus lighting unit—an International truck, a Le Roi gasoline engine, and a Marble-Card generator—was used at Friendship International Airport.

provided 1,000,000 candle power of lighting. In addition, the contractor had 5 smaller plants supplying electricity to lights set up on temporary stand-

ards. They included 2 Onan, 2 Universal, and 1 Nite-Hawk unit.

Quantities and Personnel

The major items included in this first airport contract were as follows:

Clearing	430 acres
Unclassified excavation	6,600,000 cu. yds.
Reinforced-concrete pipe, 24 to 60-inch	10,316 lin. ft.
Compaction	4,903,000 cu. yds.
Slope seeding	130 acres
Concrete for structures	4,500 cu. yds.
Reinforcing steel	270,000 lbs.

Personnel for C. J. Langenfelder & Son, Inc., included Joseph P. McInnis, Chief Engineer, acting as Project Manager; Edward F. Purcell, General Superintendent; and H. C. Foster and J. D. Warfield, Superintendents.

For Whitman, Requaardt-Greiner Co. & Associates, the consulting engineers who designed the airport and are supervising the construction, B. Everett Beavin is Project Engineer, and Graham Hevell is Resident Engineer.

General Donald H. Connolly is Executive Director of the Baltimore City Aviation Commission.

Driving Piles In CITY STREETS

The pounding of pile hammers on busy city thoroughfares announced the start of the long-needed lengthening of New York's I. R. T. subway stations. They were McKiernan-Terry Hammers, driving long steel H-beam supports for the new station extensions. Once more, as on pile-driving projects of every type for the past fifty years, McKiernan-Terry Hammers demonstrated their power and dependability.

Contractors and engineers have little difficulty in finding a hammer tailored to any specified needs as to weight, power and penetration in the McKiernan-Terry standard line . . . a choice of 10 double-acting, 5 single-acting hammers and 2 double-acting extractors.

... Helpful Information



For specifications and other information on the McKiernan-Terry line, with pictures of hammers at work, write for new McKiernan-Terry Bulletin No. CIR2.

McKIERNAN-TERRY CORPORATION
Manufacturing Engineers

19 PARK ROW, NEW YORK 7, N. Y.



Other McKiernan-Terry Activities

McKiernan-Terry quality and engineering excellence are also found in coal and ore bridges, bulk material unloaders, marine equipment and other large engineering structures performing important service to industry, railroads and our government.

McKiernan-Terry No. 7 Double-Acting Pile Hammer driving steel H-beams through Fourth Avenue roadbed for New York subway station extension. Contractors, Johnson, Mason & Hanger.

Shunk Snow Plow and Ice Removal BLADES

Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.

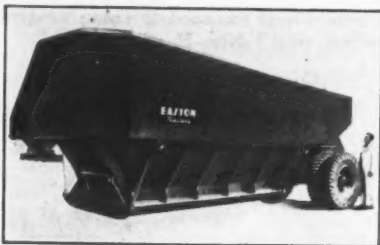
FOR ALL TYPES AND MODELS OF SNOW PLOWS
Various widths, lengths, thicknesses—flat or curved—standard or special—punched ready to fit your machine.

SHUNK SAW-TOOTH ICE BLADE

Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.

Shunk
MANUFACTURING COMPANY
ESTABLISHED 1854
BUCYRUS, OHIO.

McKiernan-Terry PILE HAMMERS AND EXTRACTORS



The new Easton TB-4030 bottom-dump trailer has a capacity of 32 tons. It features an air-powered radial gate which can be operated from the cab of the tractor or the rear of the trailer.

Bottom-Dump Trailer Has 32-Ton Capacity

A new large-size heavy-duty bottom-dump trailer is announced by the Easton Car & Construction Co. of Easton, Pa. The model TB-4030 is rated by the manufacturer at a capacity of 32 tons. A feature claimed for it is an air-powered radial gate which can be operated either from the cab of the tractor or from the rear of the trailer.

The TB-4030 bottom-dump trailer has a 4-wheel single-axle design. It uses 24-ply 16:00 x 24 lug tires, an Easton-design axle and running gear, and an Easton full-oscillating fifth wheel. The brakes are 20 1/4 x 7 and are air-operated.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 47.

Liquid Concentrate For Cleaning Solvent

A liquid aromatic concentrate for cleaning-machine solvents is made by The Curran Corp., S. Canal St., Lawrence, Mass. According to the manufacturer, when Flo is added to ordinary mineral spirits of the commercial standard CS-3-38, it will increase the solvency of the material to a high degree. This is said to permit the use of the standard mineral spirits as a highly penetrating mobile solvent with a quick and clean rate of evaporation.

This solvent is recommended by Curran for dry-cleaning metal parts as well as electrical parts and accessories, and for use on all metals in all types of equipment without harmful effects and without the danger of flammability. It is sold in 1 and 5-gallon containers, and in 50-gallon drums. Flo should be mixed in a ratio of 1 part of Flo to

10 of the mineral spirits.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 109.

Cutter for Wire Rope

A wire-rope cutter employing hydraulic power is announced by the Pell Cable Cutter Co., 55 New Montgomery St., San Francisco 5, Calif. It is made in two sizes—the Model LC which has a maximum capacity of 1 1/2-inch wire rope, and the Model JG which has a capacity of 1 3/8-inch wire rope. The Model LC weighs 70 pounds and the Model JG weighs 40 pounds.

The Hydrashear has a manually operated hydraulic pump, is entirely self-contained, and, according to the manufacturer, does not have to be anchored in place. The handle of the hydraulic pump, when locked into position, can be used as a carrying handle. The cutting blade is said to require no adjustment and is removable for resharpening. The blade and die are designed to prevent flattening or deformation of the rope.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 86.

Osgood Announces Changes

Fred L. White has been promoted to the position of Development and Consulting Engineer by the Osgood Co., Marion, Ohio. He is succeeded as Chief Engineer of the company by John E. Callouette.

The company also announces the appointment of Fred W. Raab as Export Manager for Osgood and its associate, The General Excavator Co.

Earth-Moving Equipment

A series of bulletins describing several pieces of its high-speed heavy-duty earth-moving equipment have been combined in a looseleaf folder for distribution by the Wooldridge Mfg. Co. of Sunnyvale, Calif. Among the units described in these bulletins are the Model TC Terra-Cobra with a Model S14 scraper; the Models TCR, TCN, and TCH Terra-Clippers; the Models BBM, BB-85, and BBU scrapers; bulldozers for International Harvester, Caterpillar, and Allis-Chalmers tractors; power-control units; and the Wooldridge self-cleaning rippers.

A separate bulletin is devoted to each of these units. In it is a photograph of the unit, a table of specifications, and an analysis of the unit's operational and general features. Several of the bulletins contain drawings of the equipment which point out special features of construction.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 71.

Hercules Powder Changes

Two changes in personnel are announced by the Hercules Powder Co.'s Explosives Department. Lawrence W. Early has been transferred from Los Angeles to Salt Lake City. Robert W. Crabtree succeeds him in Los Angeles. Mr. Crabtree was formerly a sales-service representative in the San Francisco office.

BOTTLENECK BUSTER—Every truck a grader with the Root Undertruck Scraper



- Quickly mounted on any 1 1/2 to 10 ton truck
- Fast-action hydraulic control

Building Better Road Machinery Since 1891

ROOT SPRING SCRAPER CO.

547 West North St., Kalamazoo, Mich.



STEEL-TIMBER
BRACE FITTINGS

STEEL TRENCH
BRACES

STEEL TRENCH
BRACE FITTINGS

DUFF-NORTON

TRENCH BRACES

Quickly Installed—
Eliminate Costly Cave-ins

Elimination of costly cave-ins makes Duff-Norton trench braces economical for all trench and excavation jobs. Constructed for rough outdoor use, they are safe and dependable. Ball and socket joint permits adjustment to any angle.

STEEL TRENCH BRACES. Supplied complete with either 1 1/2" or 2" pipe.

STEEL-TIMBER BRACE FITTINGS. Fittings include socket butt, butt end, screw and lever nut. Furnished without timbers.

STEEL TRENCH BRACE FITTINGS. Furnished with socket butt, butt end, screw and lever nut—without pipe.

Write for catalog, prices and recommendations on best braces for your needs.



SEE YOUR A. E. D. DISTRIBUTOR

THE DUFF-NORTON MANUFACTURING CO.

"The House that Jacks Built" PITTSBURGH 30, PA.

THE WORLD'S OLDEST AND LARGEST MANUFACTURER OF LIFTING JACKS

LIGHTER

STRONGER

WELLMAN

Williams Type

BUCKETS

Stronger because they're constructed of **welded rolled steel**... lighter because non-essential weight has been eliminated.

Wellman buckets meet every requirement of heavy service with longer life and lower cost! A type for every service:

Multiple Rope, Power Arm, Dragline, Power Wheel, Special Service. 3/4 to 16 1/2 yd. capacity.

SEND FOR BULLETIN

THE WELLMAN ENGINEERING COMPANY

7012 CENTRAL AVENUE • CLEVELAND 4, OHIO

Adjustable Shoring Is Made From Steel

An adjustable steel shoring system has been developed by Acrow, Inc., 155 Washington St., Newark, N. J. The company recommends it for supporting temporary form work for concrete arches, beams, walls, columns, and other shoring uses. According to the manufacturer, it also is adapted for use with scaffolding and sway bracing. The Acrow steel shoring is made in four heights ranging from 5 feet 7 inches to 11 feet, and is adjustable to 15 feet when fully extended.

Acrow explains that no jacks or bars are required and that one person can erect the shore. The inner tube is lifted into place, a pin is inserted in a hole which acts as a safety lock, and the handle is turned for final adjustment. The shoring is readily dismantled and reassembled.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 34.

Adhesive Bond Film Joins Metal to Metal

An unsupported film of pure adhesive which is said to join metal to metal and metal to other substances is announced by the Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul, Minn. Called Scotch-Weld bonding film, it is a transparent material resembling cellophane in appearance. Among the features claimed for Scotch-Weld are a high bonding strength to a wide variety of materials, ease of application, simplicity of use, assurance of adhesion over the entire surface, and inertness in water, oils, and most solvents.

In use, the film is placed between the units to be bonded and is cured by simultaneous applications of heat and pressure—a heat of from 300 to 500 degrees F for from 5 to 60 minutes, and a pressure of from 25 to 100 psi, depending on the type of bond desired.

According to tests conducted by the manufacturer, Scotch-Weld, when used to bond 0.064-inch aluminum Alclad to itself, resisted a shear test of 3,500 psi. And when the same metal was bonded to fiber, wood, and plastic surfaces, the non-metallic materials de-laminated at 880, 1,770, and 2,800 psi, respectively, without the adhesive failing.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 27.

Crushers and Pulverizers

Two folders on crushers and pulverizers can be secured from the Gruendler Crusher & Pulverizer Co., 2915 N. Market St., St. Louis 6, Mo. Featured in Catalog BR-200-A is the Gruendler line of jaw and roll crushers, hammermills, feeders, screens, and complete plants. Each of these units is illustrated and its principal features listed. A drawing which shows a typical plant layout is included.

Also being distributed is Folder BR-250 which shows the advance of Gruendler equipment during the company's 63 years of manufacturing. It illustrates some of the mobile crushing equipment the company has manufactured in the past, and also its newest units.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 49 for Bulletin BR-200-A and No. 50 for Bulletin BR-250.

I-H Builds Service Depot

A depot to speed the wholesale distribution of spare parts is under construction by the International Harvester Co. The third in a series of eleven such buildings planned, it is located at Franklin and Eustis Sts. in St. Paul, Minn. Steenberg Construction Co. is

general contractor on the project, which is estimated to cost more than \$1,000,000. The building was designed with the assistance of Raymond Loewy Associates.

Tandem 10-Ton Roller

A third model of the Sealcoat tandem rollers has been introduced since the Road Show by Shaw Sales & Service Co., 5100 Anaheim Telegraph Road, Los Angeles 22, Calif. It is a 7 to 10-ton variable-weight model. Among the features claimed for it are single-lever hydraulic steering, an electric starter, pressure lubrication, Timken bearings on all rotating shafts, and a foot-operated parking and service brake. Like its companion models, it is designed to permit operation within 2 inches of buildings, fences, or curbs.

It is powered by a 6-cylinder Chrysler engine with a fluid coupling. The 3-speed Brown-Lipp transmission allows a forward and backward speed range of from 0.93 to 4.15 mph. The

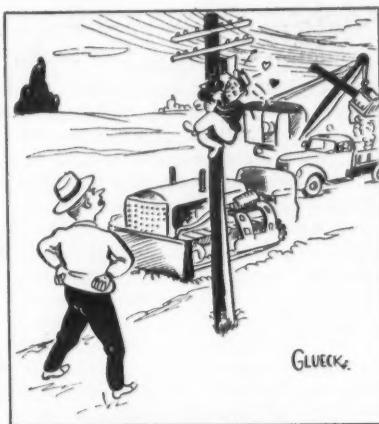
steering and compaction rollers are 50 inches in width; the wheelbase is 10 feet 1 inch; the overall length is 14 feet 4 inches; the overall width is 5 feet 6 inches; and the height to the top of the seat is 7 feet 4 inches.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 76.

Hydraulic-Equipment Data

A folder describing its line of pumps, valves, cylinders, and other hydraulic equipment has been made available by The Commercial Shearing & Stamping Co., P. O. Box 719, Youngstown 1, Ohio. This line includes the Commercial gear-type hydraulic pumps, control valves for hydraulic circuits employing oil as the operating medium, single and double-acting cylinders, power take-off units for heavy-duty trucks, valves for special applications, and multiple-sleeve cylinders.

Bulletin No. 116 describes each of these units and lists recommended uses



"Business call, Haskill?"

for each. It illustrates each unit and shows it in use on various pieces of equipment. Also listed in this folder are several manually operated units.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 2.



Rock completes dumping of aggregate, bulldozer swings into position. Grader stands by at right.

Highway Near Buffalo GETS GOING-OVER



Joseph Cerillo (left), contractor, and Gene Niland, Depew Paving Co. engineer, enjoy a hearty laugh.

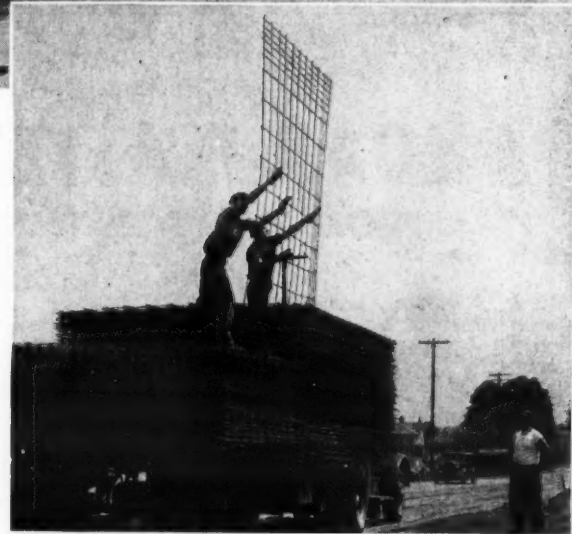
To cope with heavy traffic to and from the Buffalo area, nearly four miles of Route 20, east-west express route traversing mid-state New York, was recently rebuilt. These scenes were taken between Town Line and Alden, N. Y., and show various stages of the four-lane project. Contractor: Depew Paving Co., Depew, N. Y. More than 100,000 sq yd of bar mats were supplied by Bethlehem.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

STEEL FOR HIGHWAYS

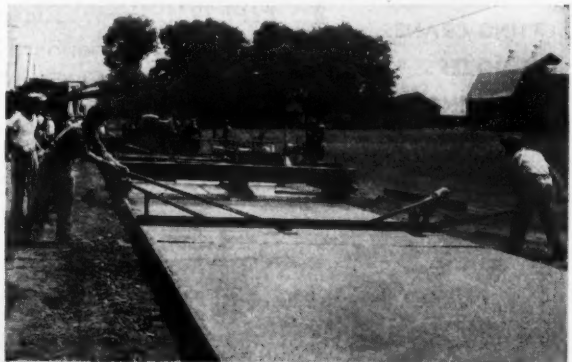
Dowel Units • Reinforcing Bars • Bar Mats • Guard Rail
Guard Rail Posts • Wire Rope and Strand • Pipe
Hollow Drill Steel • Spikes • Bolts and Nuts • Tie-Rods
Timber Bridge Hardware • Sheet and H-Piling
Fabricated Structural Steel



One, two, and over it goes. Bethlehem Bar Mats are unloaded from truck, adjacent to new highway.



With rough grading completed, foreman checks accuracy of formsetters. Fine grading will soon be underway.



Working on heels of strike-off and finishing machines, hand finishers give new strip careful, last-minute check.

Asphalt Compound For Curing Concrete

An asphalt curing compound for concrete is available from L. R. Mackenzie, Inc., 625 S. W. 9th St., Des Moines, Iowa. The Amulco compound is described as an emulsified asphalt which forms a thin, tough, and impervious cover over wet concrete. It is a homogeneous fluid which can be sprayed directly from the drums or tanks in which it is shipped without heating or other preliminary preparations.

The manufacturer states that the Amulco asphalt curing compound is approved by state highway departments and can be obtained from several licensed plants stationed throughout the United States.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 88.

Lion Oil Co. Names Manager

Ray David Cunningham is now Manager of the Protective Coatings Department, Sales Division, of the Lion Oil Co. Previously, he was Director of Sales for the Nox-Rust Chemical Corp. His appointment is part of Lion Oil Co.'s general expansion program which also includes the construction of a \$250,000 plant at El Dorado, Ark., devoted exclusively to the production of protective coatings.

Findlay Div. Staff Changes

Four staff changes are announced by the Findlay Division of Gar Wood Industries, Inc. Harry H. Smedley is Service Representative for the Western Region with headquarters in San Francisco. Byron D. Mathews is Service

Representative for the Northeast Region, working out of Boston. John D. Blood is Division Service Manager. And George S. Ames is Special Representative of the Service Department.

Smooth-Tread Tires

A smooth-tread tire for use in rock quarries or other off-the-road duty is announced by The B. F. Goodrich Co. of Akron, Ohio. According to the manufacturer, the smooth contour is especially suited to this type of application because it leaves no edges or tread grooves to catch on stumps, sharp rocks, or other hazards which are likely to cause tire damage.

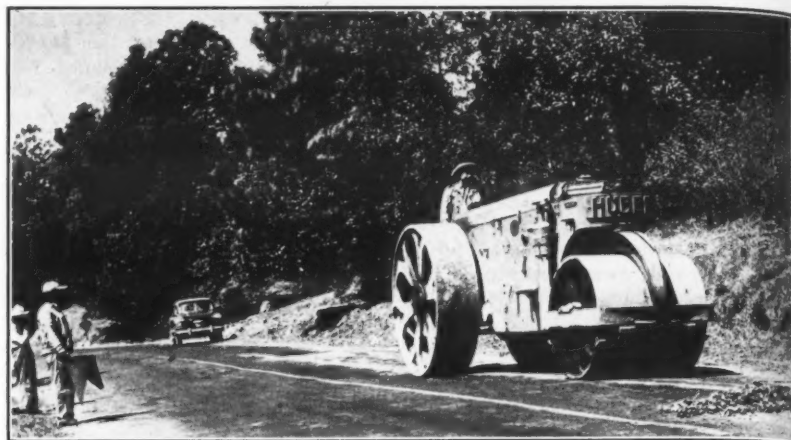
At the present time, the smooth-tread tire is made in two sizes: 9:00 x 20, 12-ply; and 14:00 x 24, 20-ply. The tire is recommended by Goodrich for free-rolling wheels or for power wheels if traction is not a problem.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 83.

Tractor Side Boom

A 4-page folder which lists the features of the Berg tractor-mounted side-boom crane has been made available by the Berg Mfg. Co., 4622 Navigation Blvd., Houston 1, Texas. The folder describes the side mounting and explains the advantages claimed for it. It also illustrates the pipe-laying operations for which the Berg crane is especially adapted.

The unit is made in four models, and complete specifications for each are provided in the folder. These cover the approximate lifting capacities at various overhangs, the diameter and length of the boom line and load line, and the



A Huber 10-ton 3-wheel roller does repair work on the scenic Mexico City-Guerrero highway which at one point is 10,000 feet above sea level. The highway draws heavy traffic, and maintenance is watched carefully by the Federal Department of Roads.

dimensions of the load-line and boom-line drum. Also listed are the details of the winches used with each model crane, the tail-end clutches, and the

transmissions.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 7.

A LOAD MASTER -- FROM EVERY STANDPOINT!



Available attachments for SHOVELLOADERS

MATERIAL BUCKETS
COAL AND SNOW BUCKETS

CONCRETE BUCKETS
LIFTING CRANES
BULLDOZERS
LOG LIFTING FORKS

The LULL SHOVELLOADER... a year around profit-producer... cuts costs over a wide range of loading operations.

Numerous loader attachments give full benefit of the tractor-loader unit during all seasons.

SHOVELLOADERS are built in 3 sizes LIFETIME hydraulic cylinder pistons and rings are standard... designed for cab mounting except extra-high lift SHOVELLOADERS.

See Your Industrial Tractor Distributor or Write

LULL MANUFACTURING CO.
MINNEAPOLIS 6, MINN.

Something NEW in HYDRAULICS

from Twin Disc

Advantages of Fluid Drive

- ... smoother flow of power
- ... protection against overloading and stalling
- ... full torque at all speeds
- ... uniform acceleration
- ... size of power unit based on running load instead of starting load

Users of small motors and internal combustion engines can now have all the advantages of fluid drive—at a very low cost. Twin Disc Hydraulic Engineers have designed a new hydraulic-conversion unit especially for small motors and engines. The new Twin Disc Hydro-Sheave Drive is a complete, easily-installed, low-cost transmission unit.

The Hydro-Sheave Drive is as easy to install as an ordinary sheave... sliding over the motor or engine shaft where it is held in place by three set screws. The unit is ready for immediate use... filled with hydraulic fluid... anti-friction bearings lubricated for life. Twin Disc Hydro-Sheave Drive is designed especially for use with Worthington QD (quick detachable) Sheaves, and is available in five sizes for use with any motor or engine in the 3/4 to 25 hp range.

Built by the largest manufacturer specializing in friction clutches and hydraulic drives, Hydro-Sheave Drive is the simplest and most economical fluid power transmission available today. For complete information, including prices and the location of your nearest distributor, write to the Hydraulic Division for Bulletin 145. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

Bottleneck Bridges Widened by Welding

County Department Finds Welding A Fast, Economical Way to Rebuild Dangerous Bridges on Its Roads

THE problem of widening bridges in spite of a limited budget has been solved by the Auglaize County Engineering Department, Wapakoneta, Ohio. The Department has decided that repairs and extensions using welding methods give satisfactory results and keep costs down. A report on the method used and the cost of repairs was made by Howard R. Craig, at that time Auglaize County Engineer, in an award-winning paper submitted in the 1947 James F. Lincoln Arc Welding Foundation "Design for Progress" program.

Three-Span Bridge

This method has been adopted by the County, he reports, for single or multiple-span bridges. For single-span bridges, it is simply a matter of adding the required extra beams and tying the framework into a single unit by welding. To illustrate the system employed on multiple-span bridges, Mr. Craig selected for his report a truss bridge of three spans, each 10 feet long. The bridge had a roadway clearance of 15 feet 9 inches; the road leading to it was 18 feet wide.

Preliminary Preparations

The first step was the removal of the existing structure. Unusable material was returned to the stock yard for possible use elsewhere—for example, the floor beams on this bridge, which were made of built-up sections and were considered unsuitable for re-use. Usable beams and materials were cleaned and made ready. The only material which had to be purchased, according to Mr. Craig, were four 18-inch wide-flange beams. These cost \$588.

Beams and Stringers

One beam was placed on the cut-off part of the wing wall, and another was placed at the center line of the walk, giving an overall width of 23 feet 8 inches. The remaining two beams were placed equidistant between the outside ones. The outside beams were welded to the rail brackets, and their ends

closed off with steel sheets. Expansion is provided for by plates located at one end of the structure on the bridge seat.

The four cross beams, secured from the County's stock yard, are 7-inch I-beams. These were placed on both ends and at one-third intervals on the 18-inch beams. Seats for the cross beams were made from small angle-iron strips spot-welded to the 18-inch beams. The cross beams were then set on these angles and welded to the 18-inch beams; the angles eliminated the need for bracing the cross beams during welding.

The stringers, six in number, were also made from 7-inch I-beams, laid so they were continuous over the cross beams. Two, spaced equally, were laid between each pair of beams. The beams, stringers, and 4-inch flooring were so spaced that it was unnecessary to alter the bridge seat in any way. Standard welds were used in the construction. The original structure was designed for 5-ton loading; the new one is rated at 15 tons.

Bracing for Long Spans

The method outlined can be used on all structures with spans of from 20 to 60 feet, Mr. Craig explains. For spans over 60 feet, the same welding procedure is used except that a timber pile bent is erected to act as a pier for support of the main girders. The timber pile bent is also used on short spans where headroom or waterway does not permit the use of deep-section beams. When deep-section beams are used, bracing is necessary between the girders.

Comparative Costs

Mr. Craig listed a comparison of costs. These are the figures he gives for a completed job, without accoutrements except as indicated.

ROETH



CONCRETE VIBRATORS
MOUNTED ON WHEELBARROW CHASSIS
Write for details and prices
ROETH VIBRATOR CO.
1737 Farragut Ave.
Chicago 40, Ill.

Cost of Bridge—Welding			
Steel erected (without labor)		\$	604.00
Labor (complete job)			332.64
Flooring			417.17
Guard rail			36.00
Total		\$1,389.81	
Estimated Cost of Bridge Using Reinforced Concrete			
Item	Quantity	Unit Price	Cost
Concrete	42 yds.	\$50.00	\$2,100.00
Reinforcing steel	12,880 lbs.	0.07	901.60
Rail	67 ft.	6.00	402.00
Joint filler	14 sq. ft.	0.35	4.90
Bronze plates	126 lbs.	1.00	126.00
Cast-iron scuppers	6	4.00	24.00
Total			\$3,558.50

These figures would indicate a saving of \$2,168.69 by the use of welding methods. Both methods were computed on the basis of a 15-ton-capacity structure.

New Ransome Gen. Mgr.

B. R. McBath has been named General Manager of Ransome Machinery Co. at Dunellen, N. J., a division of Worthington Pump & Machinery Corp. Mr. McBath was formerly Assistant to the President of the company. He succeeds William H. Scherer who retired July 1.

Catalog on 100-Hp Grader

A 24-page catalog on its new Model No. 116 grader is now being distributed by The Galion Iron Works & Mfg. Co., of Galion, Ohio. This heavy-duty motor grader has a variable weight ranging from 23,285 to 30,000 pounds, depending on attachments, is powered by a 100-hp diesel engine, is hydraulically controlled, and has a manual steering arrangement equipped with a hydraulic booster system.

Catalog No. 315 describes and illustrates each of these features in detail. It also provides information on the rubber tires, the all-gear tandem drive, and the 8-speed transmission.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 48.

Webber Joins Penn-Drake

Frank H. Webber has joined the sales force of the Pennsylvania Refining Co. of Cleveland, Ohio. He will handle the sale of Penn-Drake products in Cleveland and northern Ohio.

Let HYDRAULICS lift your equipment

use the MONARCH



HY-LO-JACK

FAN BELT DRIVEN

POWER HYDRAULIC CONTROL

Lifts equipment ten times faster than hand pump. Easy installation on new or existing equipment. Hundreds of applications, such as Snow Plows, Sweepers, Power Mowers, etc. Priced for the most conservative budget.

WRITE FOR CIRCULAR H-78

"QUALITY MACHINERY SINCE 1856"

MONARCH ROAD MACHINERY COMPANY, 327-329 Front Ave., N.W., Grand Rapids 4, Michigan

Choice of the HEAVIES

GATKE Custom-Bilt

Smooth, non-grabbing action—

Dependable holding power at all service temperatures—no let down in heavy service or on long grades—

Long wear life—fewer adjustments—reduced maintenance time and expense—

You get all these and more extra values in GATKE Genuine CUSTOM-BILT Brake Blocks.

To save your time and assure maximum results, take advantage of the GATKE Simplified Brake Survey.

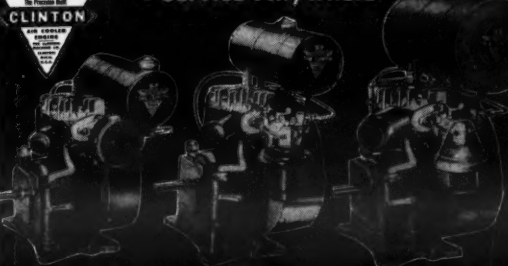
Ask your GATKE Jobber or write.

Gatke
CORPORATION

224 N. La Salle St.
Chicago 1, Illinois

3 CLINTON ENGINES

- Reliably Built
- Priced Right
- Service Anywhere



No. 500 No. 700 No. 1100
3/4 to 1.2 H.P. 1 1/2 to 2 H.P. 2 1/2 to 3 H.P.

Clinton engineers have designed these 3 quick-starting engines to give sturdy, dependable service in whatever fields their horsepower ranges are needed. Sold world-wide (service anywhere) Clinton Engines are performing daily in many versatile capacities. Uses include installations for tractors, generators, refrigeration-compressors, grain augers, elevators, pumps, small boats, construction and concrete machinery, mowers, scooters, etc.

Some desirable wholesale distributor territories are available. Also, some counties still open for authorized service stations.

For full information write Dept. 100CEM

4 CYCLE IT'S POWERED BEST
AIR COOLED When CLINTON Powered

CLINTON MACHINE CO.

CLINTON, MICHIGAN



Storm damage to the Lake Michigan shore line in the area of the South Shore Yacht Club, Milwaukee, Wis., was unusually heavy last winter. Here a Unit 1020 crane, with improved hook-roller construction, sets huge concrete blocks along the docks of the club. This action is part of an extensive program Milwaukee officials are considering for additional protection against future damage along the city's shore line.

Heavy-Duty Truck Is Made In Four Sizes

Details on its Model L 8 to 10-ton truck have been made available by the Duplex Truck Co., 830 E. Hazel St., Lansing, Mich. This truck is powered by a Hercules 6-cylinder 154-hp gasoline engine and has a gross vehicle weight of 37,000 pounds. Standard wheelbases are 166, 172, 178 and 184 inches, with special wheelbase lengths available if desired. The Fuller Model 5C650 transmission provides five forward speeds, two reverse speeds, and optional over-drive in fifth.

The truck has a 1 3/4-inch downdraft carburetor, Spicer universal joints, a Timken No. 26450 front axle and a U-200P rear axle, a Ross cam-and-lever type of steering gear, heavy-duty springs, a 72-inch-wide cab, six 11.00 x 20 tires with other sizes available, Westinghouse 4-wheel air brakes, a mechanical gear-driven governor, an Air-Maze oil-bath type of air filter, and other standard and special equipment.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 11.

Diesel-Engine Literature

Descriptive literature on the construction and operation of its line of diesel engines has been made available by the Murphy Diesel Co., 5319 W. Burnham St., Milwaukee 14, Wis. These folders describe in detail the features claimed by Murphy for its engines—including unit fuel injection, 4 valves per cylinder, dual overhead camshafts, flywheel end-cam drive, hydraulic Servo-type governor, and symmetrical cylinder block.

The folders explain the importance of each of these design features. Several engine models are illustrated, and the capacity range of the complete line is described. Murphy diesels are built in 4 and 6-cylinder models from 90 to 215 hp, and are available as fan-to-flywheel and radiator-to-flywheel engines with skid or cast-iron mountings, and as enclosed or open power units.

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The Murphy diesel electric generator sets are available in 4 and 6-cylinder models with rated continuous capacities of from 60 to 115 kw, 60-cycle, ac or dc. Murphy also manufactures marine engines in capacities of from 90 to 165 hp.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 14.

Construction Equipment Described in Broadside

A broadside on its general line of construction equipment has been prepared for distribution by the Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y. In addition to mentioning the line of rock drills, compressors, diesel engines, and electric and pneumatic tools, it lists several other bulletins which are available on the specific pieces of equipment. These include: Bulletin No. 865 on demolition tools; Bulletin No. 850 on sinker drills; Publication SP-1955 on concrete vibrators; Publication SP-2057 on utility winches;

Bulletin No. 812 on impact wrenches; and Catalog No. 899 on electric tools.

Feature of this broadside, Publication No. SP-2083, is a description of the Chicago Pneumatic portable compressors. Among the design features which are given special attention are the Simplate valves, force-feed lubrication, spring-loaded clutch, armor-clad radiator and intercooler, automotive-type steering, and group controls. Models illustrated are the 2-wheel portable, the CP-105, the CP-210, and the CP-500. The bulletin also illustrates and describes the Type Y and the Type O-CE stationary compressors.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 3.

Welding Contest Opened

The Trustees of The James F. Lincoln Arc Welding Foundation have announced September 15, 1948, to April 1, 1949, as the period for submitting entries in Lincoln's annual Engineering

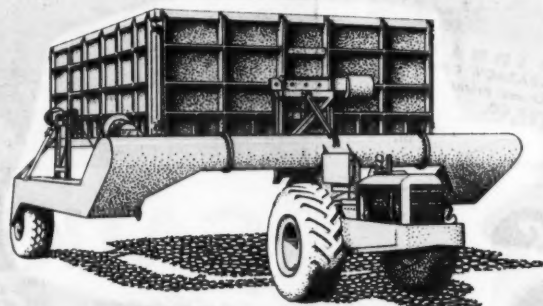
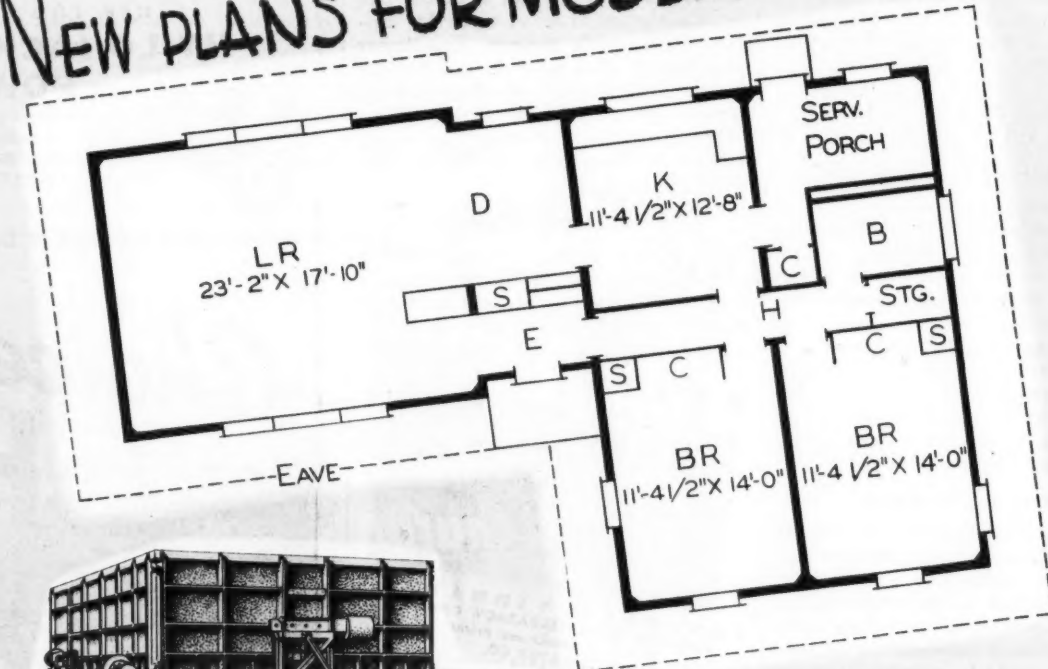
Undergraduate Award and Scholarship Program. This is the second in a 10-year series of programs designed to encourage the study of the science, technology, and application of arc welding.

Undergraduate students registered in any approved engineering school, college, or university in the United States, including the Naval Academy at Annapolis, the War College at West Point, and the Coast Guard Academy, are eligible. Prizes range from \$1,000 in cash to \$25. The schools in which the winners are enrolled will also be granted money in order to provide scholarships.

Dravo Offices Are Moved

City offices of the Dravo Corp. have been transferred to the former Pitt Bank Bldg., 5th and Liberty Aves., Pittsburgh. The building, which has been renamed the Dravo Bldg., now houses the general offices of the Machinery Division, Keystone Division, and the Union Barge Line Corp.

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Distributor Doings

AED Executive Committee Holds Meeting In Denver

The Executive Committee of the Associated Equipment Distributors met last month in Denver to consider problems of importance to the construction-equipment industry. Among the chief subjects discussed was an enlarged program of service to the industry. The meeting was headed by President A. F. Garlinghouse of Los Angeles. Other officers who attended were W. W. Bucher, Executive Vice President, New York; C. F. Halladay, Vice President, Sioux Falls; R. L. Arnold, Vice President, Salt Lake City; V. J. Sheridan, Vice President, Leaside, Ontario, Canada; Eldon M. Farnum, Treasurer, St. Louis; and Frank G. Knight, Executive Secretary, Chicago.

A regional conference was also held the beginning of this month by Region XIV, which encompasses the states of Colorado, Utah, Wyoming, and New Mexico, as well as El Paso, Texas. The meeting was directed by R. L. Arnold of the Arnold Machinery Co. of Salt Lake City. Both meetings were held in Denver, Colo.

Hyster Outlet in Missouri

Shipping Utilities of St. Louis, Mo., has been named a distributor to handle sales, parts, and service for the Hyster Co. in 36 counties in Missouri and 50 counties in Illinois. The company is owned by John G. Buettner. It will carry a complete line of Hyster equipment, and it replaces Wharton L. Peters, Inc., as distributor in this area.

Jersey Dealer for Lima

Eastcoast Equipment Co., Inc., Garwood, N. J., has been appointed sales agent by the Lima Shovel & Crane Division, Lima-Hamilton Corp., Lima, Ohio. The new agent will handle the entire line of Lima shovels, cranes, and draglines in the northern New Jersey area.

Bronx Equipment Dealer

The R. & S. Truck & Equipment Co. has moved to its new quarters in The Bronx, New York 59, N.Y. The company occupies the entire block of Edgewater Road and Bruckner Boulevard. This company handles a large line of trucks of all types and heavy-construction equipment specializing in bulldozers and rebuilding.

Dealer's Election Folder

The E. F. Craven Co., construction and road-machinery distributor of Greensboro, N. C., has prepared a promotional broadside which is especially timely in this election year. The border of the broadside consists of the pictures of the 32 men who have been Presidents of the United States. The body of the folder reproduces pictures of Dewey and Warren, of Truman and Barkley, and maps of the United States showing

how each state voted in the elections of 1924, 1928, 1932, 1936, 1940, and 1944. It also presents a blank map for use in plotting the returns of the 1948 election as they are received.

Other information included is a listing of the state from which each President hailed, his age at inauguration, and age at death.

"Cat" Dealer Celebrates

Stribling Bros. Machinery Co. of Jackson and Greenwood, Miss., is celebrating its fourth dealership anniversary as Caterpillar distributor in Mississippi. Stribling Bros. maintain parts and service facilities at both Jackson and Greenwood, with 15 field men to provide on-the-job service to Caterpillar equipment.

Brake-Lock Dealers Wanted

Monroe Standard, Inc., Wyandot Bldg., Galion, Ohio, has recently acquired the national sales rights to HydrauLock brake locks, and plans to establish a national dealer organization. Several territories are still available and the company will be glad to hear from interested distributors. The HydrauLock is described as a hydraulic device designed to serve as a positive locking unit for hydraulic brakes.

New Welding Lenses

Improved Metaklad welding lenses are announced by the American Agile Corp., 5806 Hough Ave., Cleveland 3, Ohio. Their light-reflection and absorption qualities are designed to eliminate arc glare and are reported to increase visibility.

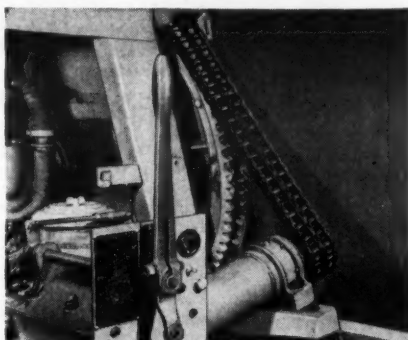
This feature is achieved through the use of a special coating on the outside surface of the lens. The coating is made from a hard and durable alloy



"Go home and rest, fellows. You can look for Spanish gold tomorrow."

of high reflectivity. It leaves a hard, transparent, and mirror-like surface on the lens to reflect the ultra-violet and infrared rays given off by the welding arc.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 35.



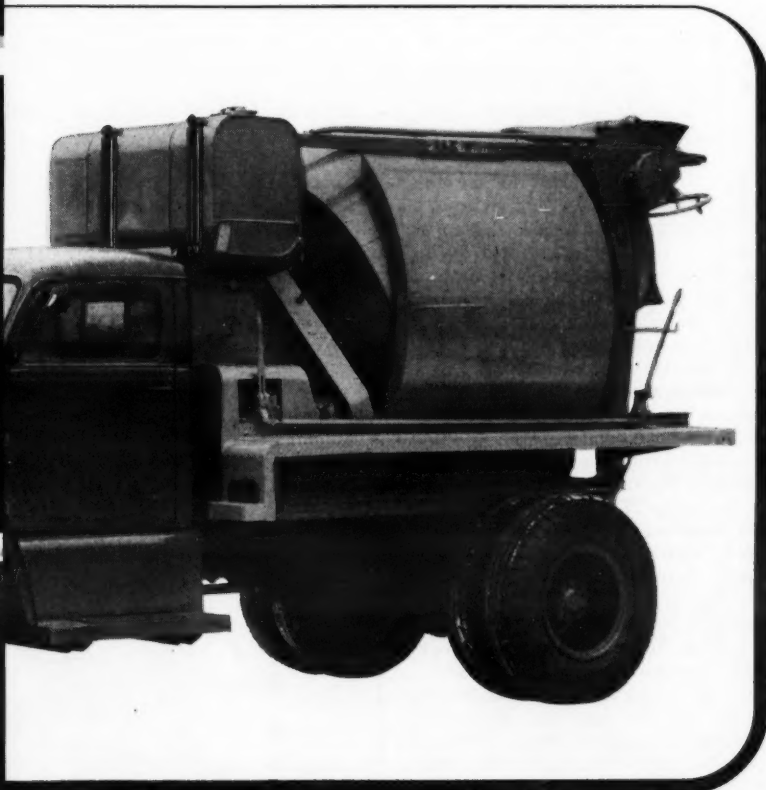
THE CHAIN TAKES THE STRAIN

The exclusive Rex chain drum drive eliminates stresses and strains. The chain protects transmission . . . gears . . . shafting . . . power plant. It eliminates binding between drum and transmission as the truck chassis weaves over uneven ground. The chain effectively dampens vibration, assuring far less driver fatigue.

**Life-Saver
Cost-Saver
Time-Saver
REX
Hi-Discharge
Moto-Mixer**



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Lower Maintenance and Operating Cost

The Rex drum drive is a weight-saver. It eliminates the need of bulky, excessively heavy transmission cases, shafting, bearings, etc. This saving in weight here permits Rex to build added strength into parts where it is really needed . . . blades, drum rollers, drum shell and drum support. Here's why Rex gives you lower maintenance costs and assures less operating time.

Time-Saving, Fast Discharge

You'll save minutes every batch with Rex Moto-Mixers. Since Rex mixes in the discharge direction, the batch is always right up at the opening . . . ready to come out in a hurry. Deep spiral scoops speed the batch out fast! Remember, it's at the job site where speed is important to avoid holding up your customer's schedules.

For all the facts, see your Rex Distributor or write for Bulletin No. 468.
Chain Belt Company of Milwaukee, 1666 W. Bruce St., Milwaukee 4, Wis.

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Moto-Mixers

Moto-Agitators

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N.Y.



Three Plants Make Hot-Mix for Airport

(Continued from page 2)

Barber-Greene, No. 2, in the middle; and No. 3, the Cedarapids, at the west end of the line. Water to supply the boilers of all three plants comes from a well 320 feet deep with a 6-inch casing. It is pumped up to a 24,000-gallon vertical cylindrical tank set up on the hill behind the No. 1 plant. From there it flows by gravity through 2-inch pipes to all three plants.

Behind the plants, the prime contractor had stockpiled 150,000 cubic yards of sand-gravel material in a long hill for use as aggregate in the base course. From this advantageous location it is easily transferred into the receiving hoppers of the three plants. Two Northwest 1-yard shovels load the material to six trucks which haul it to the plants, an average distance of 400 feet. From ramps the trucks dump into the hoppers. Crushed limestone for the wearing-course aggregate is supplied to the job by the Arundel Corp. of Baltimore. This material is stockpiled, and loaded to the receiving-hopper bins at the plants by converting the shovels to cranes equipped with clamshell buckets. Esso asphalt and Bunker C fuel oil for the boilers are delivered to the airport by tank trucks from storage plants in Baltimore.

No. 1 Plant

Aggregate for the Cummer plant, No. 1, at the east end of the row, is dumped into a 12-ton hopper, from the bottom of which it is fed to a 12-foot-high cold elevator. From the elevator the material is discharged into a 28-foot-long x 72-inch-diameter drier, which is heated at the opposite end by two burners, a Hauck and a Gem. The dust and fines are drawn off to one side into a dust collector by means of a Buffalo 70-inch fan, which is driven at 340 rpm by an Allis-Chalmers 30-hp motor. They drop down to the bottom of the dust bin, and then slide down a chute by gravity to the foot of the hot elevator. The heated material out of the drier is also discharged onto this elevator, which raises it 38 feet to the screens at the top of the mixing tower.

For the base course, the Robins 4 x 10-foot vibrating screen had only a single deck divided into 1½-inch and No. 4 openings. When mixing wearing-course material a double-deck screen is used, with four different sizes of openings—1-inch, ½-inch, ¼-inch, and No. 8. Below the screens is a 40-ton bin divided into four compartments of 10 tons each. For the base-course work, only two compartments were necessary, one for the sand and one for the gravel. From the bin the aggregate drops into a weigh box equipped with Fairbanks dial scales, and then into the 4,000-pound pugmill.

At the right of the plant is an 8,000-gallon fuel-oil tank alongside a Farrar & Trefts Bison oil-burning locomotive-type 72-hp boiler, which supplies steam at 125-pound pressure. This furnishes steam for the drier jets, and also heats the asphalt in the 8,000-gallon horizontal tank at the left of the mixing tower. The asphalt is pumped in a continuous loop from the tank to the weigh box, through a 4-inch steam-jacketed line, by a Viking 3-inch electric pump, driven by a G-E 15-hp motor. By means of a three-way valve, the asphalt is pumped from the delivering tank truck either to the storage tank or to the mixing-tower line.

An International UD-18 100-hp diesel engine drives the drier, while the other movements of the plant are electrically motivated. Power is supplied by a Caterpillar D17000 140-hp diesel engine operating a Louis Allis 112½-kw generator. The various electric motors are connected to the generator. The Link-Belt apron feeder at the bottom of the

receiving hopper works off a G-E 7½-hp motor with a reducing-gear transmission. A gate regulates the flow of material according to the moisture content. Another G-E 7½-hp unit runs the hot elevator, while a G-E 5-hp motor operates the vibrating screens. A 60-hp gear-head motor is required for the pugmill.

Bunker C oil is pumped from the storage tank to the burners on both the drier and the boiler by a Viking 1½-inch pump driven by a G-E 7½-hp Tri-Clad motor. The fuel oil in the tanks of all three plants is heated to 160 or 170 degrees F on this job, for greater efficiency. The oil pressure to the burners is kept at 60 pounds.

Between the Cummer No. 1 plant and the Barber-Greene No. 2 plant is an Ingersoll-Rand air compressor driven by a U-6 31-hp gas engine. This supplies 15 cfm of air at 100 pounds of pressure, and is used to fire the boilers at both plants.

Plant No. 2

The continuous-mix 110-ton-an-hour Barber-Greene plant occupies the center position in the three-plant set-up. A Viking 1¼-inch pump driven by a 5-hp electric motor pumps fuel oil to the burners on both the boiler and drier. Power for the motor comes from the diesel electric generator on either plant No. 1 or plant No. 3, in case one or the other happens to be shut down. A switch in the electrical hook-up permits this choice. Outside of this one electric-driven pump, all the other movements of the Barber-Greene plant are actuated by three diesel engines—two International UD-18 100-hp units, and an International UD-14 76-hp engine.

One UD-18 drives the hopper feeder, cold elevator, drier, hot elevator, and screens, and is located at the rear of the plant. The other UD-18 runs the pugmill or mixer, the conveyor from the gradation unit, and the gradation-unit feeders, and is placed alongside the pugmill. The UD-14, at the dust-collecting bin, operates two Clarage No. 23 fans which draw the fines and dust from the drier into the big dust bins.

From the 15-ton receiving hopper, the aggregate is moved by the feeder arrangement to the 24-foot-high cold elevator which drops the sand and gravel into a Model 837 24-foot-long x

7-foot-diameter drier. The material is heated from the other end by a Hauck burner. After being heated, the aggregate moves up a 42-foot-high hot elevator, along with the fines which have been moved from the dust collector to the bottom of the elevator by a screw conveyor.

At the top of the elevator the material is screened over a Simplicity 4 x 10-foot double-deck screen, the upper with 1½-inch openings and the lower ¾-inch in size. The oversize is chuted down into a tailing bin, where the material is dumped into trucks and hauled back to the airport. The above screening system was used for the base course; for the wearing courses the screen gradation is similar to that described at plant No. 1. Below the screens is a 40-ton bin divided into four equal compartments, two for sand and two for gravel.

From this bin the layout of the plant

makes a right-angle turn as the aggregate is released by a Model 866 gradation unit onto a feeder. It then goes up another enclosed hot elevator, 24 feet high, to a Model 842 utility mixer. Here the material is sprayed with asphalt and mixed in a continuous process. The bituminous concrete is discharged from the end of the plant by a conveyor belt into waiting trucks alongside and below the level of the belt. A wooden platform on the other side of the truck runway permits a worker to level off the mix as it is dumped into the trucks.

On the right side of the plant is a horizontal 12,000-gallon asphalt tank and a vertical 10,000-gallon tank for Bunker C fuel oil. The material for these tanks is unloaded from the transport trucks by means of two Heil 2-inch pumps, one at each tank. They are coupled in series and driven by a Wisconsin 30-hp gas engine. Near the tanks

(Continued on next page)

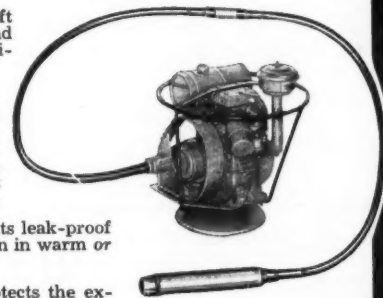
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STOW CONCRETE VIBRATOR

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STOW Vibrators last a long time because:

- The famous STOW Flexible Shaft with its tough music wire core and abrasion-resistant casing is engineered for rough usage.
- The Vibrator Head has a wear-resistant steel case; precision, high-speed ball bearings; newly designed eccentric weight that greatly reduces the load on the bearings—a sturdy overall construction that provides years of rugged service.
- Oil lubrication of the Head with its leak-proof shaft seal insures efficient operation in warm or cold weather.
- A guard ring carrying-handle protects the exhaust muffler, carburetor and air cleaner from accidental damage—a protective feature that eliminates many motor repairs . . . keeps your Vibrator working.



• STOW Vibrators come in a variety of sizes and speeds. See them at your regular equipment supplier or write today for catalog 4610 describing the STOW Vibrator particularly suited to your job.

STOW Manufacturing Co., Inc., 40 Shear St., Binghamton, N.Y.

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DRAGLINE BUCKETS

the Original
LIGHTWEIGHT BUCKET

First in the Field!

with features like these

HIGHER ARCH
Gives greater clearance for digging and dumping. Carries a bigger load.

CONTINUOUS LIP
Special tough rolled alloy steel extends to bucket top on both sides. Strengthens the whole front end.

WEDGE SHAPE
Digs easier—dumps cleaner. Fills with a shorter pull—load slides out through the wide arch.

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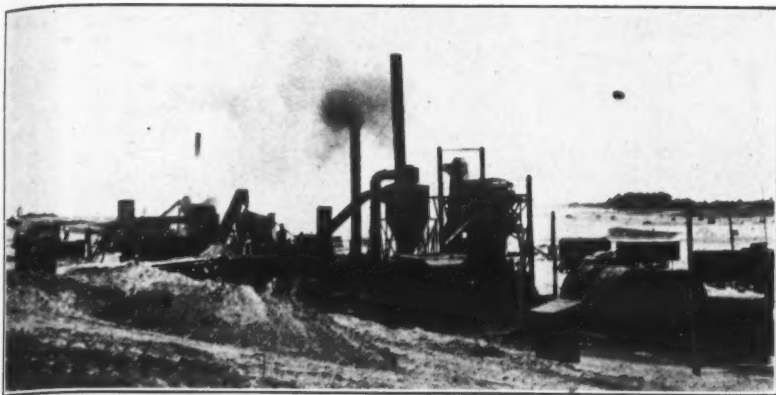
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Duplex Straight Frame Construction means much easier, much more dependable plow and scraper mounting!



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LANSING 4, MICHIGAN
PROTECTED DEALER FRANCHISES AVAILABLE IN SOME AREAS



C. & E. M. Photo

Here's a view of the three asphalt plants on the Baltimore airport job—the Cedarapids in the foreground, the Barber-Greene in the center, and the Cummey in the background. They are 250 feet apart in a row.

is an Economic 100-hp locomotive-type boiler which supplies steam to the plant at 125-pound pressure.

The mixing unit of the plant is equipped with two Viking asphalt pumps. One 3-inch pump draws the heated asphalt from the big tank in steam-jacketed lines to a 750-gallon auxiliary storage tank alongside the pugmill. The other 2-inch unit pumps the asphalt into the mixing box through a spray bar, flushing it against the aggregate as it enters the chamber.

Plant No. 3

Plant No. 3, the 100-ton-an-hour Cedarapids, is at the extreme left or north end of the layout, and is operated in the main by electric power generated at the plant. A Caterpillar D17000 diesel drives an Electric Machinery 125-kva generator, which operates several G-E electric motors to make the wheels go around. The American Size 600 blower fan on the dust collector, however, runs off a V-belt drive hooked to a GMC diesel engine.

From the 28-ton receiving hopper at the rear of the plant, the aggregate is moved through a bottom feeder to an 18-foot cold elevator. The latter unloads the material into a 24-foot x 72-inch-diameter drier, which is heated at the opposite end by a Hauck oil burner. A 36-foot-high hot elevator raises the hot sand and gravel to a 4 x 10-foot single-deck vibrating screen. The dust and fines drawn off into the dust collector slide down a chute by force of gravity to the bottom of the hot elevator, and are raised to the screen with the rest of the aggregate.

WORKING ON UNDERGROUND LINES?

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Philadelphia 43, Pa.

CABLE INSTALLATION & MAINTENANCE
TOOLS & EQUIPMENT

compartments, one for the sand and the other for gravel, from which the aggregate is released into weigh boxes equipped with Kron dial scales. From there the material drops into the 3,000-pound pugmill.

At the extreme right side of the plant are two horizontal oil tanks holding 11,000 gallons and 4,500 gallons. A 2-inch pump driven by a gasoline engine is used to transfer the oil from the trailer trucks to the tanks. Between the plant and these tanks is a locomotive-type oil-burning steam boiler, rated at 125 hp, which supplies steam for the plant at 120-pound pressure. At the left of the plant is a 20,000-gallon horizontal tank for asphalt storage. Behind the plant the oversize aggregate is collected in a tailing bin.

A Schramm Model 20 air compressor supplies air for use in firing the boiler. Asphalt is unloaded from the trucks to the storage tank by a 2-inch pump driven by an Allis-Chalmers engine. From the tank it is pumped through a

4-inch steam-jacketed line by a Kinney 3-inch pump to the pugmill.

The numerous electric motors at the plant include a 60-hp unit for the pugmill; 30-hp for the drier; 7½-hp for the hot elevator; three 5-hp motors for the cold elevator, screens, and asphalt pumps; and a 1½-hp motor for a Blackmer 1¼-inch fuel-oil pump which transfers the oil from tank to boiler.

The Mix

The sand-bituminous mix for the base course conformed to the following basic formula:

Sieve Size	Per Cent Passing
1-inch	100
¾-inch	90-100
No. 4	75-100
No. 10	56-90
No. 40	24-56
No. 80	8-35
No. 200	5-10
Asphalt (85-100 penetration)	5½-7½

The two top courses use crushed stone for the coarse aggregate, and vary (Continued on next page)

DALLETT'S "HOLEDRILL"



Dallett's New Self-rotating, Light Weight Pneumatic Drill

Dallett's Holedrill has an instantaneous rotating action which eliminates the need of drill bit wrenches. A patented retainer prevents accidental release of the drill in tool, an invaluable feature for working on scaffolding or over water.

Speedy—Indispensable

The Dallett Holedrill drills holes quickly in concrete, brick, mortar and all types of stone or rock. It does the job in a fraction of the time required by other methods. The Dallett Holedrill can be used almost anywhere. Its great accessibility makes quick, light work of many apparently impossible jobs. Indispensable as an industrial maintenance tool—and an absolute necessity for the construction contractor.

SPECIFICATIONS

CAPACITY:(at high speed)
¼" to ¾" Drills.

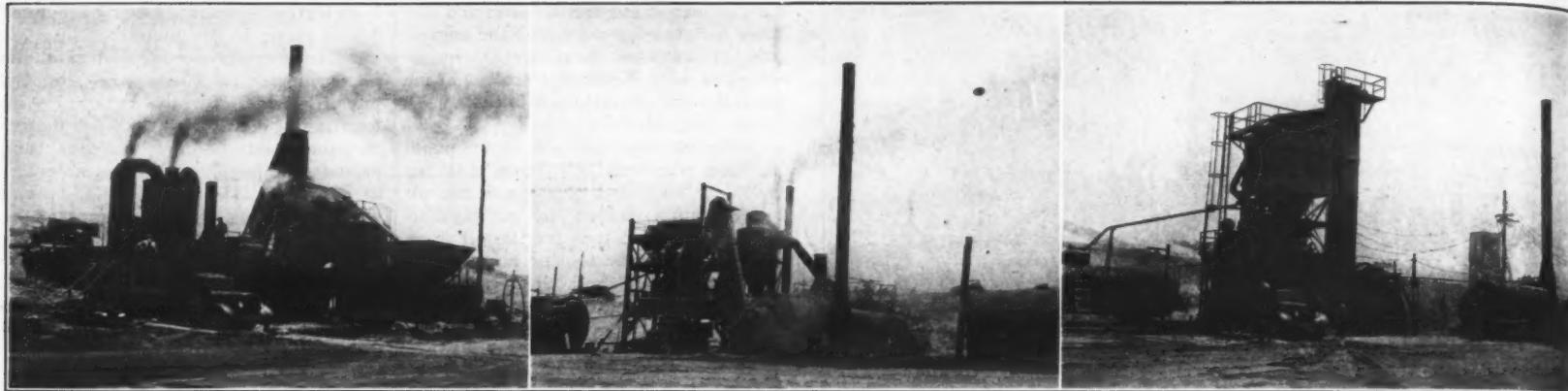
WEIGHT:
9½ lbs.

SPEED:
1800-2000 S.P.M.

LENGTH:
With Retainer 16"
Without Retainer 13"

Write for Bulletin 102

THE DALLETT COMPANY
Manufacturers of Pneumatic Tools and Accessories
SINCE 1883
MASCHER AT LIPPINCOTT STREET
PHILADELPHIA 33, PENNSYLVANIA



Three Plants Make Hot-Mix for Airport

(Continued from preceding page)

slightly in gradation as follows:

Sieve Size	Per Cent Passing	
	Binder	Surface
1-inch	100	100
3/4-inch	75-100	85-100
1/2-inch	64-88	72-92
No. 4	38-64	46-70
No. 10	25-50	32-55
No. 40	12-28	16-33
No. 80	7-18	10-23
No. 200	2-10	4-10
Asphalt (100-120 penetration)	4-6 1/2	5 1/2-7

Laying the Pavement

The batch hauling was sublet to Eastern Contractors, Inc., of Baltimore, which uses a fleet of 12 Autocars holding from 10 to 12 tons of material. Four trucks are usually assigned to each plant, with the average haul for the whole job about 2 miles. The mix is placed in the trucks at temperatures ranging between 275 and 300 degrees F, and tarpaulins are then stretched over the contents. On the way out of the plant the temperature is checked, and the trucks are weighed on a Winslow beam scale. At frequent intervals the insides of the truck bodies are sprayed with a light grade of No. 2 fuel oil to keep them clean, and to prevent the hot-mix from sticking.

The 7-inch base course was laid in two 3 1/2-inch layers by a Barber-Greene Finisher. Laid to a loose depth of 4 inches, each course compacted under rolling to the specified 3 1/2 inches. Four Buffalo-Springfield 10-ton tandem rollers handled the compacting. The first roller started work at the same time as the Finisher, but the second

roller, which looked after the back rolling, came on 1 1/2 hours later. The back rolling continued for that same length of time after paving.

Two finishing machines, moving along at the rate of 18 feet per minute, accounted for the output of all three plants during the laying of the base course. The average production was 2,500 tons in a 12-hour single-shift day. Paving started in a lane next to the center line of the runway, with the finisher following a string for line on this first lane. For the rest of the inner lanes no string was necessary, as the machine simply followed along against the lane already paved. When the final outside lane was reached, the string line was again used to give a smooth edge. On the base course the finisher laid 10 and 12-foot lanes in sections of about 2,000 to 3,000 feet. In this way the joint was kept hot, for when the machine had gone that far it turned and came back on the adjoining lane.

For the 1 1/2-inch binder and surface courses, the material is laid to a loose depth of 1 1/4 inches to take care of the resultant compaction from the rollers. Two Barber-Greene Finishers are employed on these top courses which are laid in 9 and 10-foot lanes. In this way the joints do not coincide with those of the base course beneath. Half the width of the 150-foot runway, for instance, required three 10-foot lanes and five 9-foot lanes for the required 75 feet.

Although only two finishers are in use at a time, several others are kept on the job in reserve. The paving crew for each machine consists of a foreman, operator, two screed men, two rakers, one man dumping trucks, and two roller operators. No bituminous prime coat

These three asphalt plants are turning out hot-mix paving for the Friendship International Airport. The one at left is a Barber-Greene continuous-mix unit which turns out 110 tons an hour. The one in the center is a Cedarapids 100-ton-an-hour plant. And the one at right is an 80-ton Cammer unit.

was applied to the field before paving started, but the contract contained provisions for a tack coat to go down between courses of pavement, if the engineers deemed it necessary to effect a better bond between the successive layers of plant-mix. This tack coat con-

sists of a fog application of RC-2 or RC-3, put on at the rate of 0.1 gallon to the square yard.

Major Items

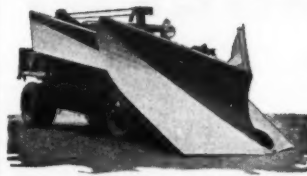
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(Concluded on next page)

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Sterling WHEELBARROWS

ing operations had just started and the grading was still going on, a force of about 300 men was employed at the airport. The construction of the 10-inch pavement by the two subcontractors was supervised by A. R. Baker, Vice President of the American Asphalt Products Co.; E. Stewart Mitchell, President of the Bituminous Construction Co.; and Henry O. Freeze, General Superintendent.

The major items in this second contract of C. J. Langenfelder & Son, Inc., include the following:

Excavation, general	305,000 cu. yds.
Excavation, duct-line	85,500 cu. yds.
Super-compaction of subgrade	1,269,000 sq. yds.
Reinforced-concrete pipe, final drainage, 18 to 48-inch	38,000 lin. ft.
Selected material for base course	240,625 cu. yds.
Plant-mix sand-bituminous base	250,450 tons
Top coat between courses, RC-2 or RC-3 asphalt	68,800 gals.
Bituminous binder course, 1 1/2-inch	58,310 tons
Bituminous surface course, 1 1/2-inch	57,280 tons
Bituminous material for seal coat	151,360 gals.
Cover aggregate for seal coat	3,440 tons
Seeding, mulching, topsoil	300 acres

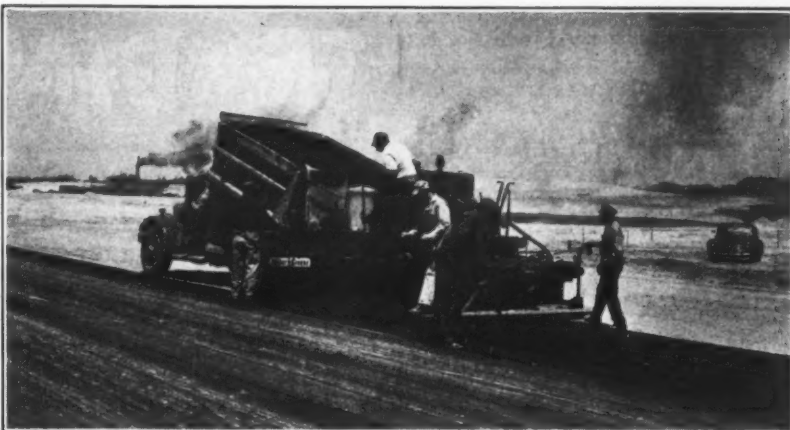
The contract also contains provision for placing a bituminous seal coat on top of the final 1 1/2-inch surface course, but it is still undecided whether or not this will be necessary.

New Terminal Building

Enough space is available at the site for the construction of three additional runways, but the next important contract to be awarded by the Baltimore Aviation Commission will be for a modern terminal building. This will be of the latest design, and will be centrally located to the three runways. Passenger comfort will be featured in the two-story structure which will have complete facilities under one roof. Three piers will lead from the waiting room, and will connect directly to the planes by enclosed ramps. This will be all done on the one level, and the passenger will be protected from the weather at all times. His baggage will be handled on a lower level.

Until the new Friendship International Airport is completed, Baltimore will still be served by its existing municipal airport which is located on the north side of the lower harbor. It was built in 1942 on 360 acres of mostly filled-in land. In the future this field will be used as an amphibious air base, and for military or cargo planes.

When your Community Chest drive starts, give as much as you can. The Community Chest is a neighbor's job.



C. & E. M. Photo

A Barber-Greene Finisher lays the first layer of base course at the west end of Runway C on the new Baltimore Airport. The loose depth of 4 inches will be compacted under rolling to 3 1/2 inches. A truck is dumping hot-mix into the hopper of the finisher.

Dump-Type Trailers

A line of tandem-axle dump-type semi-trailers is manufactured by the Truck Engineering Corp., 1285 W. 70th St., Cleveland 2, Ohio. The TEC dump trailers are available in various sizes, and the several body types permit their use for handling materials such as sand, gravel, cement, stone, etc. The Model No. 3SF-SW has a pay-load capacity of 16 tons, and the Model 4SF-SW is made in two sizes with capacities of 18 and 25 tons.

All of the TEC trailers can be fur-

nished with a powered fifth wheel or with a pump installed on the tractor and equipped with hose for operating the hoist on the trailer. Location of the trailer axles and fifth wheel is determined by the use to which the trailer will be put. The 3SF-SW uses 9.00 x 20 tires and the 4SF-SW uses 10.00 x 20 tires. The trailers have Gar Wood hoists, and the brakes are either mechanical with vacuum boosters or air-operated.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 18.

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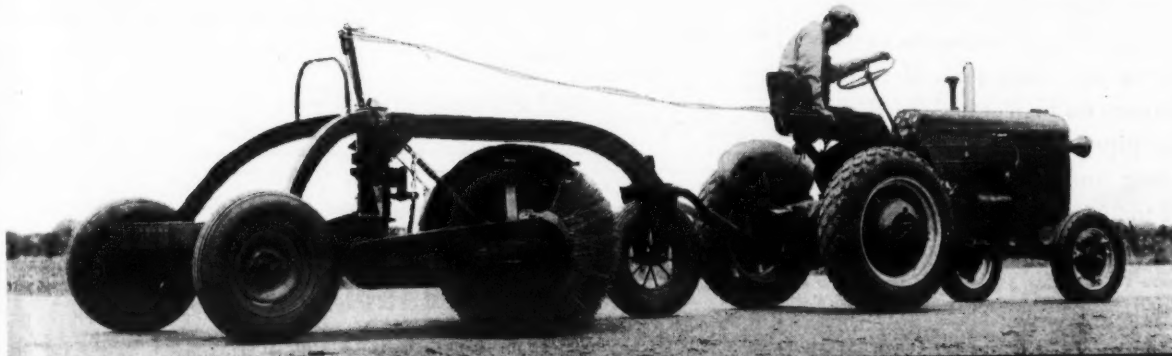
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A new-model heavy-duty steam cleaner is announced by the Ewing Mfg. Co., P. O. Box 875, Oklahoma City 7, Okla. The Ewing Master Deluxe '48 is of the stationary type and can burn butane, propane, or natural gas. It is set on a 30 x 30-inch base, is 54 inches in height, and has 300 feet of steel-tubing coil.

Among the safety features built into the '48 are a 3-way valve, pop-valve, and thermostatic control. It has outlets for two standard steam hose or one heavy-duty hose, and it requires a 600,000-Btu input. The manufacturer explains that it is necessary only to turn on the water and gas to start cleaning operations.

Ewing also manufactures six other models and sizes for a wide variety of equipment and parts-cleaning jobs.

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Data on Hydraulic Jack

A 25-ton hydraulic jack is described in a broadside issued by Curtis Jack Co., Inc., 1234 Roy St., Seattle 9, Wash. Among the features claimed for this pyramidal-design jack are low clearance, a high and a low speed, a lift of 16 inches, light weight, ability to operate in any position, and hydraulic action. Also listed in this broadside is the smaller 12-ton jack, similar to the larger model but with a single hydraulic pump instead of two. The company states that early production of larger sizes, up to 100 tons capacity, is contemplated.

The broadside contains a design drawing showing the location of the various parts—oil filler, needle valve, cylinder, lowering spring, piston, pump, etc.—and also the dimensions of the unit. A table of specifications for the 12 and the 25-ton models covers weight, size of base, working clearance, lifting range, maximum tested load, and prices. Copies of this literature may be ob-

tained from the company. Or use the enclosed Request Card. Circle No. 46.

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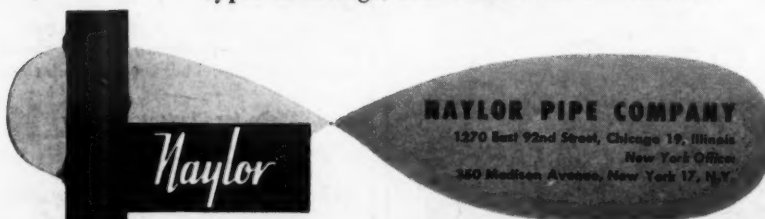
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Hydro Spreader Corp.	74	Woolery Machine Co.	77
Independent Pneumatic Tool Co.	67	Worthington Pump & Machinery Corp.	
Industrial Products Co.	37	Worthington-Ransome Constr. Equip. Div.	10
Ingersoll-Rand Co.	55	Yaun Dragline Buckets & Mfg. Co. Plant	54
International Harvester Co.	42, 43, 76	Ziegler Co., Inc., Wm. H.	14
Irvington Form & Tank Corp.	93		
Jaeger Machine Co.	16		

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- 1—Scoopmobile, 1947, 3,000 lb. cap., 1/2-yd. Bucket, 12-ft. track with extensions, lift fork attachment.
- 1—Pumpcrete, Rex, Single 160, with 435 ft. pipeline. New April 1948, used 3 months, reconditioned and repainted July 1948.
- 1—Tractor, Caterpillar, RD-4, 7-ft. blade, rear power control unit with Adams Hauling Scraper, Model 30, 3-5-yd.
- 1—Mixer, Concrete, Smith, 14 S, with Allis-Chalmers 10-HP, 440-Volt motor.

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What users say about high-speed rubber-tired **TOURNADOZER**

Operator William V. Stewart says:
"Fastest method I've ever seen for cleaning soil . . . easy to operate . . . easy to grease."



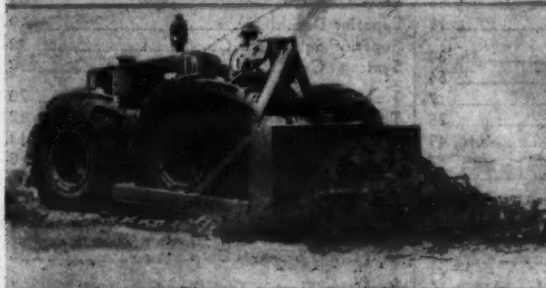
Operator Barney Sullivan says:
"It sure is easy to handle. I can look over blade and see what I'm doing."



Mine Owner J. A. Howe says:
"It does a good job any place we put it . . . will do about 50% more spoil than a crawler."



Superintendent W. A. Pahlala says:
"Tournadozer gives a remarkable saving in travel time . . . it's especially good for scattered jobs."



Operator Louis Rosenbaum says:
"On pusher work I keep four scrapers working steady, loading sand and silt."



Contractor Sam Falbo says:
"You can cross tracks . . . pavement, etc., without damage . . . produce more than a crawler."



Plant Manager E. R. Evans says:
"I estimate Tournadozer will move as much shale in 1/2 day as crawler can in a full day."



Operator James F. Ross says:
"Can do a day's work and not be half as tired . . . more power than crawler . . . sure good on fuel."



Operator J. Ross Denham says:
"On Tournadozer you don't get the 'old jar', you can make 1 1/2 cleaning passes to a crawler's 1."

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